

Mining

CONGRESS JOURNAL



SEPTEMBER
1954

Stops Blinding

Increases Capacity — Cuts Screening Costs

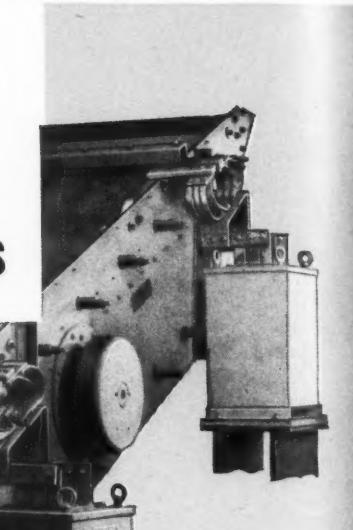


You can screen fine, moist material *continuously* with a *Thermo-Deck* heating unit. No down time required to clear fine or medium mesh screen cloth!

Heated screen cloth remains open . . . you get *more* tonnage through the screen and better separation.

Operating records prove that heated wire cloth screens last up to three times longer than non-heated cloth, because they do not have to be pounded free of blinded material. For the same reason, you save man-hours too. These lower costs increase your profits.

The *Thermo-Deck* unit can be applied to Allis-Chalmers screens in the field. See your nearby Allis-Chalmers representative for complete details. Or write Allis-Chalmers, Milwaukee 1, Wis., for Bulletin 07B7812.



POWER ON, Thermo-Deck heating unit keeps screen cloth clear on vibrating screen handling fine, moist material.



POWER OFF, troublesome blinding occurs. This view shows same screen as above, with Thermo-Deck unit shut off.

Visit the
ALLIS-CHALMERS EXHIBIT
at the *American Metal Mining Exposition*
San Francisco Civic Auditorium
September 20-23

BOOTHES

125-

135-

141

ALLIS-CHALMERS

Thermo-Deck and Sta-Kleen are Allis-Chalmers trademarks.



A-4474

Use Denver "Sub-A" Flotation Machines for Roughing, Scavenging and Cleaning

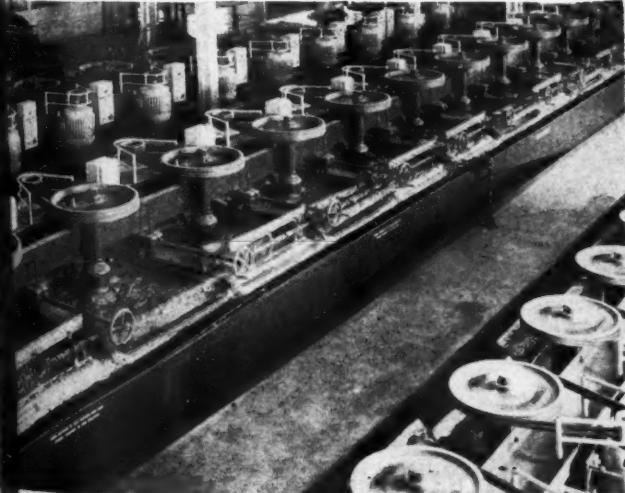


DENVER "SUB-A'S" RECOVERING NICKEL: In Canada, Denver "Sub-A's" play an important part in processing 40,000 tons a day of nickel-copper ore. Here are several of the 552 No. 30 (56x56) Denver "Sub-A" Flotation Cells operated by this company. Denver "Sub-A" Flotation was selected after extensive tests. Denver "Sub-A" Flotation is standard in practically all copper-nickel mills.

High Grade Concentrate

Denver "Sub-A's" are recognized the world over for their ability to produce high grade selective concentrates.

DENVER "SUB-A'S" RECOVERING LEAD AND ZINC: Denver "Sub-A" Flotation Cells in large Australian lead-zinc mill. Lead rougher flotation is accomplished in a 12-cell No. 30 (56x56) Denver "Sub-A" and cleaning is done in a 10-cell No. 24 (43x43) Denver "Sub-A." Zinc flotation is performed with identical units.



High Economic Recovery

More large plants are recognizing the importance of installing Denver "Sub-A's" for their entire flotation job—roughing, scavenging, cleaning and re-cleaning. This practice results in maximum recovery and lowest cost per ton of ore treated.

DENVER "SUB-A'S" RECOVERING COPPER: Here 5000 tons of copper ore per day are processed in 120 No. 30 (56x56) and 32 No. 24 (43x43) Denver "Sub-A" Flotation Cells. These cells were installed for both roughing and cleaning after a series of competitive tests with other flotation machines.



Low Maintenance and Power Cost

The Denver "Sub-A" is easy to maintain. Many operators report wearing life of parts of 2 to 15 years. Power is low and used efficiently. No pumps are required to recirculate froth and middlings in the cleaning circuits.

For further details on improving your flotation circuit, please write to DENVER EQUIPMENT COMPANY, 1400 17th St., Denver 17, Colorado, phone CHerry 4-4466.



Complete Mill Equipment.
You have one manufacturer—
one responsibility.



DENVER EQUIPMENT CO.

1400 17TH ST., DENVER 17, COLO.



coal production goes up, up, up with JEFFREY mine equipment



BLOWERS

Fresh air helps miners increase production. Lightweight, low-height Jeffrey blowers move air efficiently through tubing for auxiliary ventilation to sweep working faces in rooms or hard-to-reach places. Compact, portable.



683-53

AERODYNE FANS

Proper ventilation brings healthier, safer conditions underground, and more coal is mined. AERO-DYNE Fans deliver maximum air flow economically and with low maintenance.



71-49

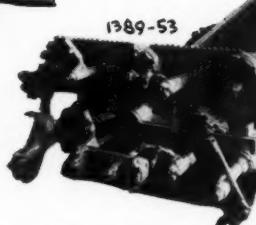
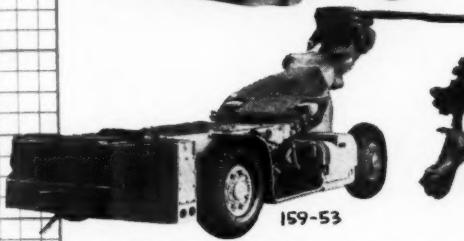
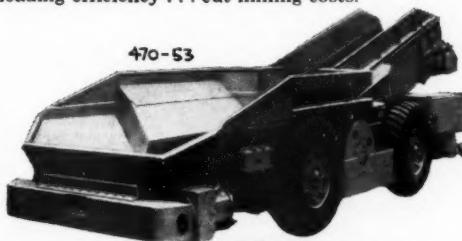
The finest coal mining equipment in the world — that's why production at Jeffrey-equipped mines goes *up and up*.

Jeffrey offers a complete line from face to tipple . . . the best engineering research and development available . . . 77 years of world-wide mining experience . . . sales and service from strategically located district offices and warehouses.

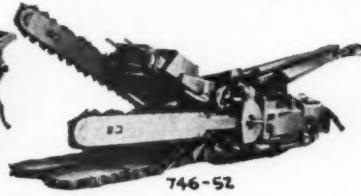
Read about the equipment illustrated here. Then telephone or write your nearest Jeffrey district office.* Find out how Jeffrey mine equipment can make *your* coal production go *up and up*.

* Beckley • Birmingham • Chicago • Denver • Harlan • Pittsburgh • Salt Lake City

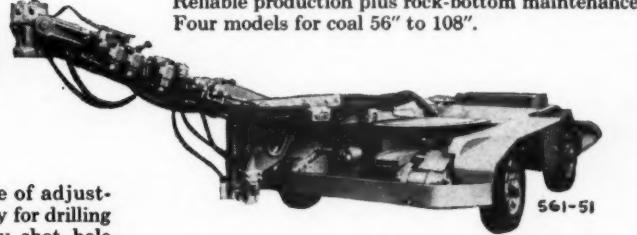
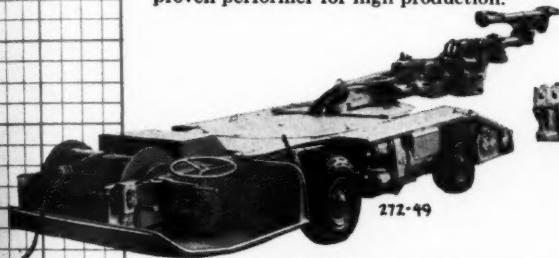
SHUTTLE CARS—Three rugged models—MT66, MT67, MT68—in 24" to 54" basic heights. Their speed, high capacity and easy steering save time from loader to main haulage system... increase loading efficiency... cut mining costs.



LOCOMOTIVES—Dependable performance makes Jeffrey locomotives the coal industry's production workhorses. Rugged overall design and improved features assure low maintenance and high tonnage.



UNIVERSAL CUTTERS—The extremely maneuverable 70-UR will make any desired cut in coal seam. Quick, positive and accurate response saves time, results in greater tonnage per man-day. A proven performer for high production.

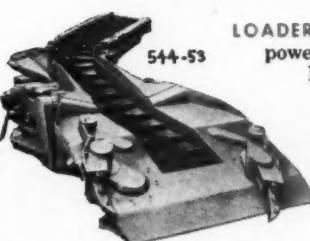


DRILLING MACHINES—Wide range of adjustment on 56-FHR means peak flexibility for drilling in any position, giving fast and easy shot hole placement. Completely hydraulic in operation.



BELT CONVEYORS—No delays when large coal tonnages are handled with Jeffrey sectional belt conveyors. Designed for belt widths 26" to 48", they give continuous haulage for gathering or main line transportation. Light, medium and heavy duty types.

ROOF DRILLING MACHINES—Fully hydraulic operation gives 56-RDR speed and quick response. Easily adaptable to mine production cycle. Hydraulic torque wrench assures predetermined, uniform, accurate bolt tightening.



LOADERS—Total punch of 64 horsepower provides the 81-A Crawler-Loader with ample power for the toughest loading jobs. Rated capacity is 8 TPM; maximum capacity is 10 TPM. Peak performance and low maintenance make the 81-A today's best loader buy.



THE JEFFREY

**IF IT'S MINED, PROCESSED OR MOVED
... IT'S A JOB FOR JEFFREY!**

ESTABLISHED 1877
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Columbus 16, Ohio

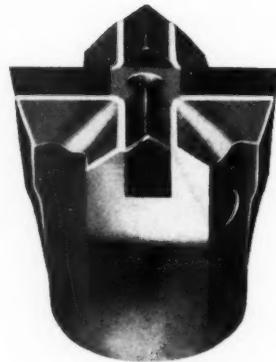
**sales offices and distributors
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PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.

TEAMED FOR DRILLING EFFICIENCY....



**Crucible CA Double Diamond
Alloy Hollow Drill Rods**



**Crucible HY-Tuf for tungsten
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Here's a combination you just can't beat . . . detachable bits of Crucible HY-Tuf® alloy steel with tungsten carbide inserts and Crucible CA Double Diamond® Alloy Hollow Drill Rods . . . the toughest, longest-lasting drill steel made.

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54 years of **Fine** steelmaking

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REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS
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SEPTEMBER, 1954

VOLUME 40 • NUMBER 9

Mining

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Circulation

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Published Monthly. Yearly subscriptions, United States, Canada, Central and South America, \$3.00. Foreign \$5.00. Single copies, \$0.30. February Annual Review Issue, \$1.25. Entered as Second-class Matter, January 30, 1915, at the Post Office at Washington, D. C.



Indexed regularly by Engineering Index, Inc.

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LINE YOUR TRUCK BEDS WITH AMSCO MANGANESE STEEL PLATE

Absorb greater shock, double service life

Amsco manganese steel plate is especially well suited to the job of "half-soiling" truck beds. It resists tremendous shock. It turns a tough hide to the clawing action of abrasive materials. Its nonmagnetic properties make it ideal for moving in under the electromagnet.

For example, the company, whose truck is pictured above, lines each of their new truck beds before putting them into service. Under the severe test of a 3½-minute loading cycle, they have found that truck-bed life is extended from *two* to *five* full seasons.

Amsco manganese steel plate is also recommended because it is easy to weld, easy to cut with an oxyacetylene torch.

Whether you half-sole your truck beds new or wait until they are worn thin, it will pay you to consider Amsco manganese steel plate. For additional information, write Amsco Division, Chicago Heights, Ill.

Other applications for Amsco hot-rolled plate

CHUTE LINERS • SIDE SHEETS • DRAGLINES • PATCHING POWER DIPPERS
DREDGE BUCKETS • SCRAPERS • STEEL MILL EQUIPMENT • CRUSHER LINERS
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Brake Shoe

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

"Monobel"® AA solves our 2 main problems— breaks down 38-inch 'middleman,' cleans bottom well"

reports superintendent of a large Alabama coal mine

"Up to three years ago," he declared, "we had a double shooting problem on our hands. One was our 38" 'middleman,' a real trouble maker. The other: the job of breaking our coal loose from the bottom, as it is often burned tight to the floor. Naturally, we tried

several permissibles, but none of 'em gave us *both* good breakage and bottom-cleaning action. Then we tried 'Monobel' AA. It's helped us solve both problems: breaks down the 'middleman' and cleans the bottom, assuring good loadability, high tonnage per man."



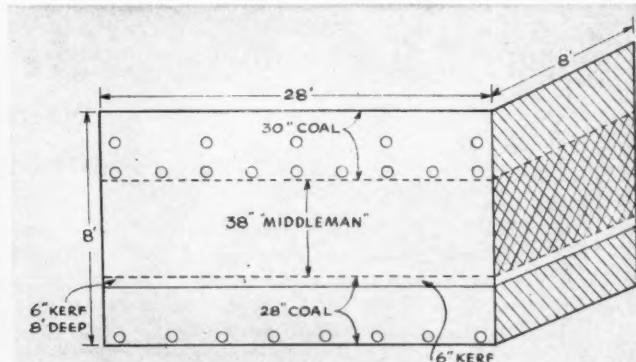
1. All holes charged, foreman makes final inspection just before shot. Here's the heavy 38" "middleman" that must be broken down and fractured so that loading machines can handle it without delay.



2. Typical fall of coal in mine shows how "Monobel" AA breaks down both coal and "middleman." And thanks to its slow spreading action, this permissible shears the back and ribs, and breaks the coal loose from the bottom.



3. Room completely cleaned up and ready for cutting. Note how "Monobel" AA has cleaned off the bottom and sheared the back right through the "middleman" to give a clean, straight face for the next fall.



4. Shooting pattern was developed in cooperation with Du Pont technical service men. Du Pont "Monobel" AA has sufficient water resistance to withstand the wet bottom-hole conditions found in this mine.

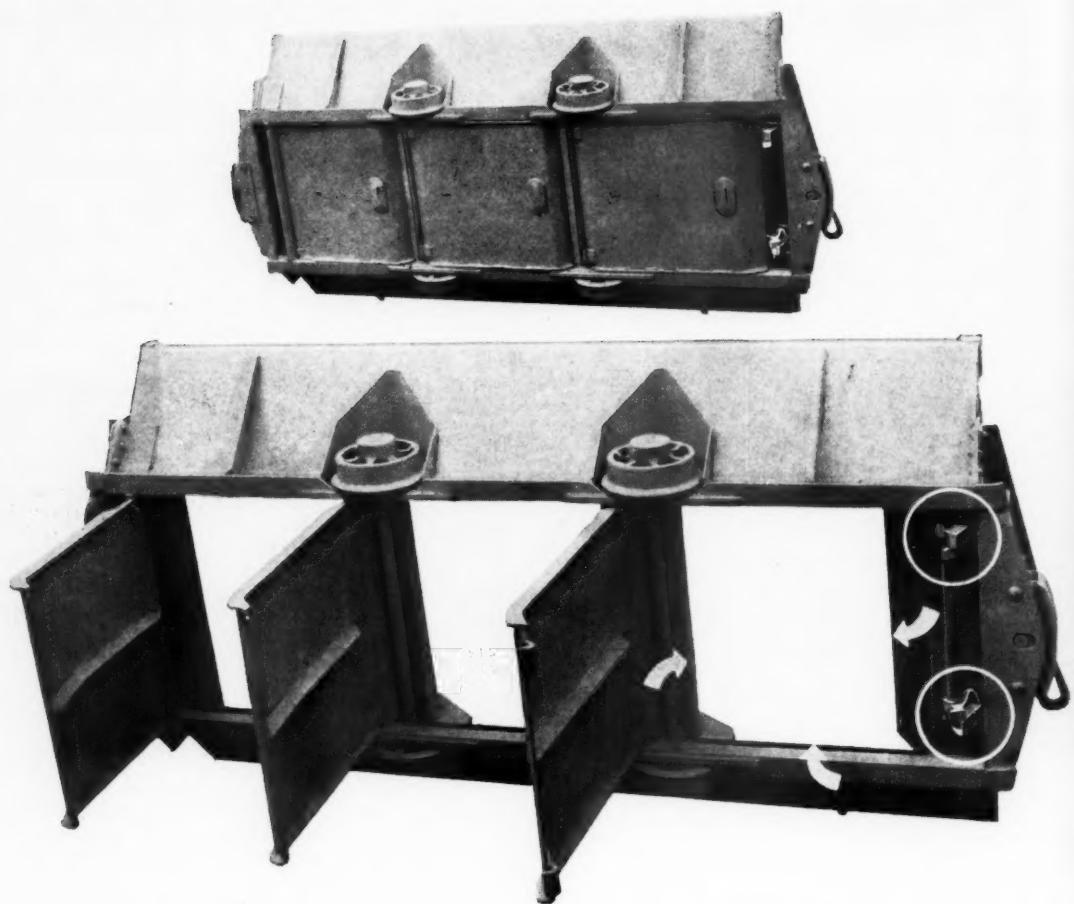
Whatever your big problem: "middleman" . . . coarse coal . . . or wet holes . . . Du Pont "Monobel" AA permissible dynamite can help you solve it. Mine owners and operators throughout the field use it . . . report its all-round efficiency has paid off. For complete information on "Monobel" AA, contact the Du Pont Explosives representative in your area. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT PERMISSIBLES

Blasting Supplies and Accessories



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



Only S-D Automatics have "Twin Safety Latches" . . .

. . . two latches for safe and sure latching that are tripped simultaneously underneath car for automatic dumping

WITH S-D "TWIN SAFETY LATCHES" your bottom dumping car doors are actually padlocked twice. These latches (see circles in large photo above) are tripped independently by a pair of tripping devices mounted between the rails. Both latches must be tripped simultaneously before the doors open. This eliminates doors opening accidentally anywhere along the haulage route. (Small photo at top shows bottom view of an S-D Automatic with doors closed).

Other advantages offered by S-D Automatics are: (1) from a quarter to a half-ton greater capacity for any overall dimension and (2) the only automatic dumping car completely sealed against dust leakage. (Arrows in large photo above point out the flares that extend over doors when closed, sealing material in car). This important improvement gives you a safer operation by preventing leakage of dust and enables you to eliminate the major portion of track clean-up costs. For complete information write us today.

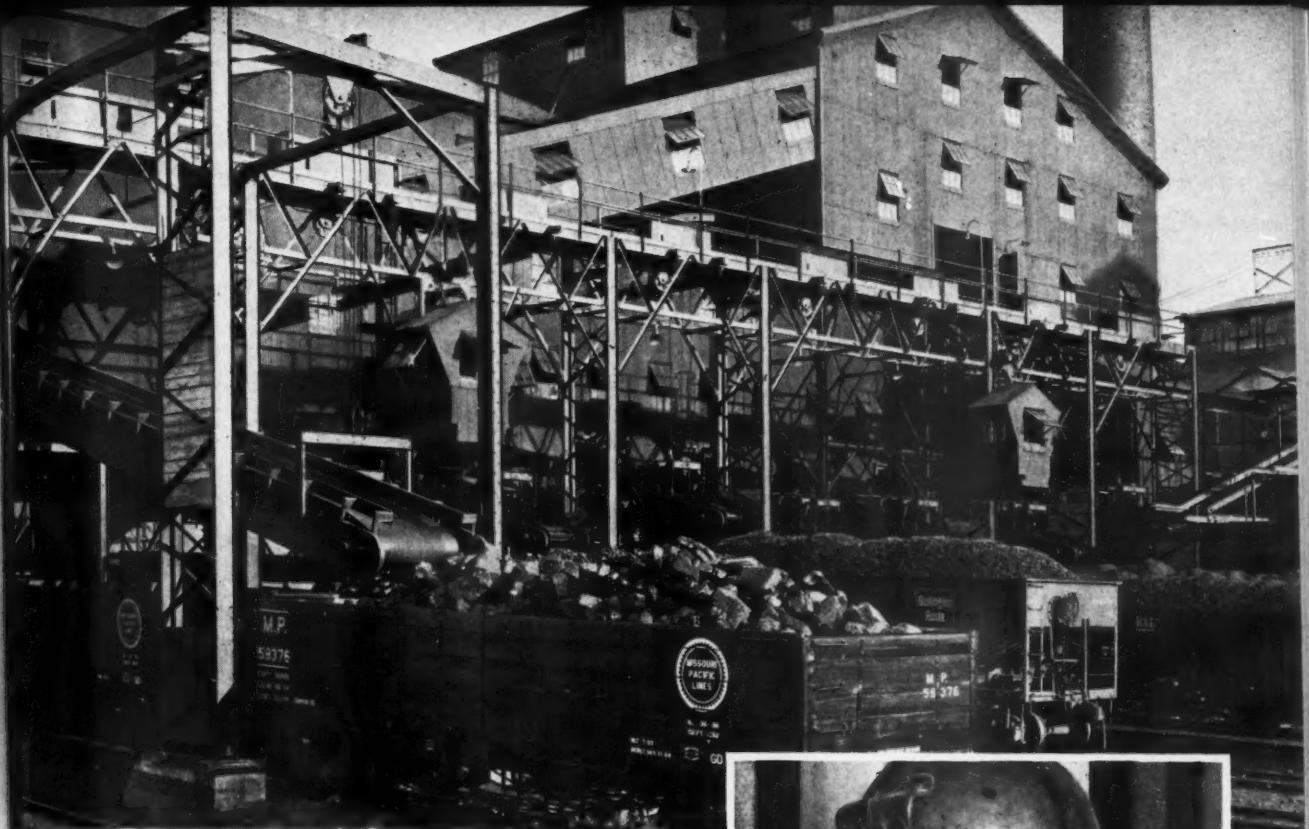


Sanford-Day
IRON WORKS

KNOXVILLE • TENNESSEE

BROWN-FAYRO
DIVISION
JOHNSTOWN, PA.

MINE CARS, All Types - PRECISION
WHEELS - "Brownie" HOISTS
CAR RETARDERS - SPOTTERS
PUMPS - OIL SPRAY SYSTEMS



"Mine problem...my problem"

says Standard lubrication specialist

• The large midwest mine whose preparation plant is pictured above is just one of the many satisfied Standard Oil mine customers throughout the Midwest. In addition to experienced Standard lubrication specialists always ready to give valuable help wherever and whenever it's needed, Standard provides the Midwest's most dependable source for quality greases and lubricants. For every mine lubrication purpose—Standard products prove superior in actual use!

In the mine pictured above, the following products have had a successful job history:

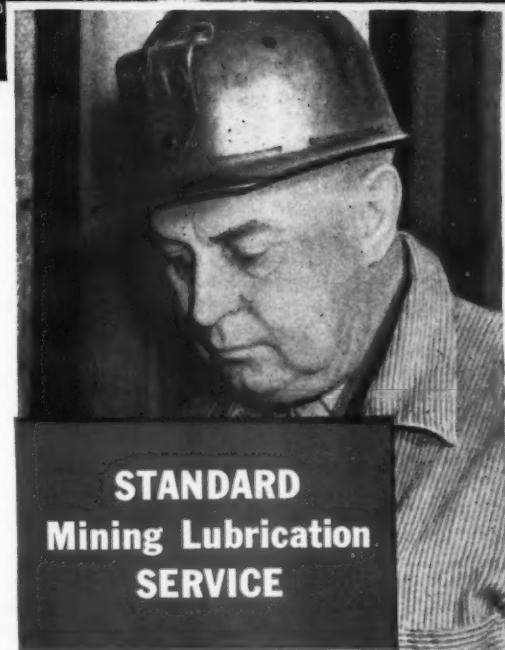
SUPERLA Mine Lubricant No. 00—used in gear cases and hydraulic units of the mine loaders. Result: no clutch or bearing failures; clean, carbon-free clutch plates; no downtime for maintenance on hydraulic units.

SUPERLA Mine Lubricant No. 4—used in the loader gathering heads. Result: despite terrific shock loads, wear has been kept to a minimum.

STANOLITH Industrial Oil—used in the speed reducers in the tipple. Result: trouble-free, smooth operation keeps costly maintenance time down to a minimum.

STANOLITH Grease—used throughout the tipple on grease fittings and on conveyor belt idler bearings. Result: better protection; grease consumption reduced; grease application time cut 50%.

Why don't you put Standard quality and Standard versatility to work for you today?



Standard Oil lubrication specialist, Herve Dillingham, helped this midwest mine with its lubrication program. The Standard Oil lubrication specialist near you can help you get good results on your lubrication problems. Call your nearest Standard Oil office. Or write, the Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY



(Indiana)



3/4" and 5/8" O-B Bail-Type Units Factory-Assembled for Easy Installation

- Now available in both sizes, O-B Bail-Type Shells and Plugs offer you several patented features that insure faster, easier installation.
- Units are factory-assembled with shells and plugs in correct relation to each other, allowing you to easily fit them into minimum size holes.
- O-B Bail-Type unit design eliminates costs of upset ears on bolts or other auxiliary devices to support shell during installation.
- Holding power of O-B's 3/4" and 5/8" Shells and Plugs exceeds breaking strength of roof bolts. Maximum expansion also assures you improved holding power in soft material.

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MANSFIELD  OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

4502-M

See Special June Haulage Ways on O-B Bail-Type Unit Installation



A NEW ONE-MAN DRILLING MACHINE

with integral air-leg feed and
automatic air-water back-head

perfected
by

Thor

No. 380 AUTOMATIC DRILLING MACHINE

With Aluminum Cylinder
and Piston

TOTAL WEIGHT 80 LBS.
36" OR 48"
FEED



INTEGRAL AIR FEED eliminates improvised clamping, extra air hose; consolidates drilling and feed controls on back-head of machine. Easier to set up, easier to adjust, easier to run.

AUTOMATIC AIR-WATER BACK-HEAD controls water and air from single throttle. Optional plugs for dry collaring, or dry drilling. Provides complete versatility for all drilling conditions.

Check these *Thor* features!

- 1 CONTROLS conveniently grouped on back-head for safe, convenient operation.
- 2 EXCLUSIVE SIX POSITION THROTTLE VALVE . . . from complete shut-off of air and water, to full air and water in logical steps for full control and convenience.
- 3 AIR LEG CONTROL KNOB conveniently located for natural, right-hand operation. Exclusive instantaneous push-button release for safety.
- 4 SINGLE AIR HOSE supplies air to drill and to leg (through drill and mounting swivel).
- 5 PERFECT BALANCE of drill and leg eliminates superfluous adjustments.
- 6 HINGE JOINT between drill and leg has tension adjustment. Exclusive extra-large friction disc holds selected tension indefinitely.
- 7 CONSTANT BLOWING ACTION cleans holes of cuttings, keeps cuttings out of chuck and drill.
- 8 FOR USE AS SINKER, air leg can be easily detached by loosening one nut.
- 9 WATER AND AIR HOSE swing freely at left, out of operator's way. Exclusive fastening method eliminates possibility of connections loosening or leaking.
- 10 EXCLUSIVE 2 1/4" DIAMETER FEED LEG provides added pressure to keep bit on face for longer life, especially when tungsten carbide bits are used.
- 11 EXCLUSIVE NEW HOLDING HANDLE provides greater safety. Conventional spade handle optional.
- 12 EXCLUSIVE SCRAPER RING on piston rod prevents solids from entering cylinder. "O" ring seal repels liquids.

For Complete Details or Demonstration Write

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ELECTRICAL ANNUAL

Help your men to help themselves...and help you with this

NATIONAL BRUSH DIGEST

A bimonthly publication of National Carbon Company, a Division of Union Carbide and Carbon Corporation. Written especially for electrical maintenance men as a service by America's best known brush manufacturer. Designed as a helpful guide . . . A handy reference on the subject of Brushes and Commutation.



Correct selection and application of brushes . . .



... together with proper commutator care PAYS OFF . . . in improved machine performance, fewer maintenance headaches, less costly downtime. Here is the first of a series of quick-reading articles in easy-to-keep pamphlet form to help you get better acquainted with the commutator and some of the every-day things you can do to keep it in tip-top shape. In this, and future issues we will cover timely topics that

The more your men know, the more they're worth . . . to you. Based on NATIONAL CARBON'S 70-year experience in brush theory and practice, this series of pamphlets is specially edited for the operating man. Installments are short, easy to read, clearly illustrated, hold his interest, provide a regular reminder of the company's interest in him. Saved for reference, these pamphlets are a handy source of information on many practical maintenance problems encountered in his work.

No. 1
Good Machine Performance
Brush Commutator Teamwork

and Set Brushes—and many more. We have been asked 'many times to put such information into condensed form . . . and today's high cost of machine replacement pinpoints the need now. The "National" Brush Digest brings you solid subject matter in a manner we hope you will find enjoyable . . .

Good Machine Performance

There are a great many factors involved in good machine performance with question as to which are the most important. When machines are made many of these factors are built in as part of the design. We are choosing elements which are closely associated with commutator and brush maintenance. Some of these trace back to qualities built in by the machine's manufacturer; others accrue from proper commutator maintenance and brush application once the machine has been placed in operation. In coming pamphlets we will dig in deeper detail into these 6 Elements of Good Performance. We will show you some of the things you can do to attain them in your own operation and thus enjoy the best possible performance from your machines. Meanwhile, let's sketch in these important elements.

No. 2
Brush Categories
Applications
Maintenance Film

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MAINTENANCE SUPERVISORS!

FREE Two Year Course in Motor and Generator Maintenance



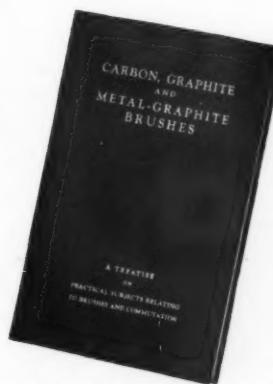
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FILL IN THE BLANKS BELOW AND MAIL. Then, every other month thereafter, for 24 months, you will receive as many copies of the current issue as you need. *You* decide who is to get the course . . . distribute each

issue as you see fit among your men. *One* request, and you automatically receive all subsequent installments in the quantity requested, including any back issues prior to your request.

And for yourself...

A De Luxe edition of our 115-page treatise on brushes and commutation, each costing several dollars to print. This is a GIFT to you for helping distribute National Carbon's FREE Maintenance Course where it will do you — your company and your men — the most good.



NATIONAL CARBON COMPANY

30 East 42nd Street — Room 1328 — New York 17, N. Y.

Gentlemen: Send me copies of each installment of your Brush Maintenance Course including any installments issued prior to this request.

I understand that this offer is made by your company as an industrial service and in no way obligates me or my company to National Carbon Company or to the use of its products. I am to receive the above series of pamphlets, plus a complete De Luxe Copy of "Treatise on Brushes and Commutation", free of any charge.

NAME TITLE

COMPANY

ADDRESS

Signed

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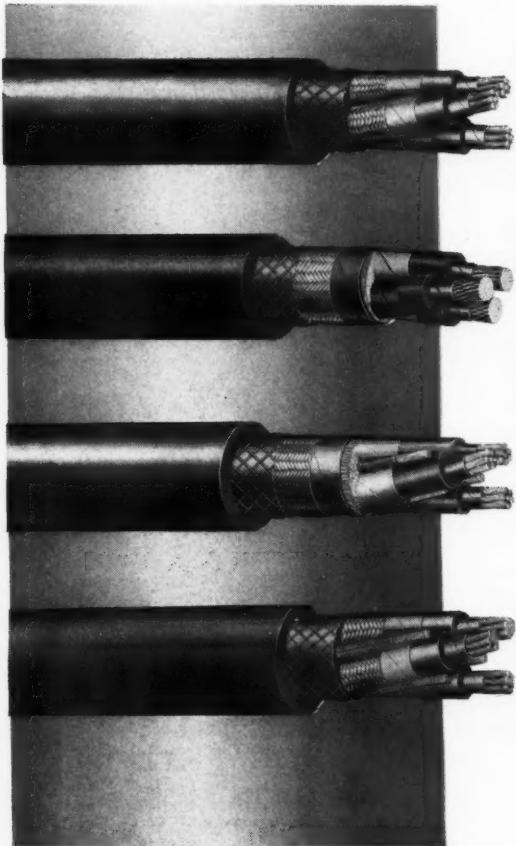
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Send for illustrated booklet on U. S. Electrical Wires and Cables for the coal mining industry.



U. S. Royal SH-A Cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound, and covered with colored tapes and a braided coated copper shield. The conductors are then cabled and covered with a reinforced jacket of 60% black neoprene. The shielded braid over each insulated conductor eliminates corona cutting by static discharge through equalization of surface stresses.

SH-B cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound plus colored tapes. Conductors are then cabled with jute fillers, covered with a rubber-filled tape, a braided coated copper shield and reinforced 60% black neoprene jacket. The shielding braid protects the men handling the cable in the event of fault currents.

SH-C cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound and covered with a colored tape. The conductors are cabled with jute fillers and with the specified fabric-covered ground wires in the conductor interstices; then covered with a rubber-filled tape, braided coated copper shield and a reinforced 60% black neoprene jacket. This allows grounding of equipment and provides an adequate low-resistance path for short circuits, thus insuring circuit breaker operation. The grounded equipment provides protection to workmen under fault conditions.

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United States Rubber Company is the only electrical wire and cable manufacturer to grow its own natural rubber, make its own synthetic rubber and its own plastics. This permits control of the production process—resulting in a quality product.

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ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.





Four TR-200's work up to 460 hours a month ... average only 4 hours down time

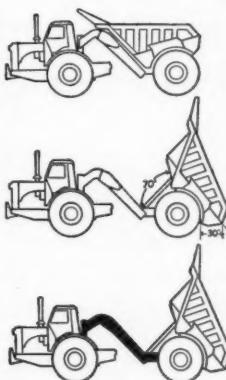
In less than a year, the George W. Kerford Quarry Company, Atchison, Kansas, put 3,828 hours of work time on each of their four Allis-Chalmers TR-200 Rock Wagons. They piled up 460 hours a month over one five-month period. During the year, service down time for each unit averaged only 4 hours a month . . . this means that each rock wagon was on the job over 98 percent of working time!

The TR-200's have been hauling quarry stone from the pit to a crushing plant 1 1/2 miles away. Loads average 16 tons and each cycle is completed in 14 min. Fuel consumption has been about 3 1/4 gal per hour with no oil needed between changes.

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big factor in year-long production output.

Don't say "seven isn't enough" until you see what others are doing with the biggest seven-yard performer that ever hit the mine pits.

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Mining

CONGRESS JOURNAL

Published for the Entire Mining Industry

by the AMERICAN MINING CONGRESS

JOHN C. FOX, Editor

VOLUME 40

SEPTEMBER, 1954

NUMBER 9

Watch and Wait

ON August 20, President Eisenhower announced his decision to disregard the Tariff Commission's recommendations that he raise the duties on lead and zinc to the maximum allowable by law. Instead he announced a three-point program designed to "strengthen our mobilization base for lead and zinc."

He expressed his belief that ". . . we must maintain a strong and vigorous domestic mining industry for the production of strategic and critical materials which have important defense uses, and that this should be done in a manner consistent with our general economic and foreign policy objectives."

In the case of lead and zinc he hopes to accomplish this end by:

(1) Increasing Government purchases, at market prices, of newly-mined domestic lead and zinc under the long-term stockpile program. He estimated these purchases might add up to 200,000 tons of lead and 300,000 tons of zinc in the current fiscal year.

(2) Procuring foreign-produced lead and zinc for the supplemental stockpile authorized under the Agricultural Trade Development and Assistance Act of 1954. Materials procured for the "supplemental" stockpile are to be above and beyond those needed for the regular stockpile. They would be insulated, for release only "under stringent statutory conditions."

(3) Apprising foreign suppliers of lead and zinc, through the State Department, that increased stockpile buying is to help *domestic* producers and urging them not to take unfair advantage of it.

As yet the Office of Defense Mobilization has not revealed at what rate it plans to purchase lead and zinc during the remainder of the fiscal year. The only inkling that stepped-up purchases are contemplated is its latest "open" offer to buy. All previous offers have been for fixed amounts.

The executive order defining the policy of the Department of Agriculture in acquiring lead and zinc for the "supplemental" stockpile is not expected for several weeks. There is some pessimism regarding this barter program since the foreign countries that produce lead and zinc also produce the commodities the Agriculture Department will want to exchange for the metals.

Expressing the industry's disappointment "in the President's decision not to approve the clear-cut case for the restriction of excessive imports from coun-

tries of low wages and depreciated currencies recommended unanimously by the Tariff Commission," and restating the industry's preference for an anti-dumping tax, Otto Herres, chairman of the National Lead and Zinc Committee, went on to say, "there is no question that the expanded stockpiling program will provide a strong shot in the arm to revive the mines if properly administered to that end."

Thus, Herres points out that production plus imports of zinc for the first six months of 1954 totaled 88,000 tons per month. Monthly slab zinc consumption plus zinc in ores used as zinc oxide have totaled about 76,000 tons, leaving an excess of 12,000 tons per month. Purchase of 300,000 tons of the metal over the next ten months, to June 30, 1955, would drastically reduce the amount of zinc available for consumption and should result in rising prices.

Probably the real accomplishment of the industry's two year campaign, which resulted in the Tariff Commission's recommendations, has been the recognition by the Administration of the importance of domestic mines to the welfare and defense of the country. This, together with the help that stepped-up stockpiling will bring and the President's promise that, "If the course of action above outlined has not accomplished the objectives we seek, I will be prepared early next year to consider even more far-reaching measures, and to make appropriate recommendations to the Congress," are encouraging. We can only wait and see what the future will bring.

Congratulations

RECENTLY W. J. Clements, Secretary of Mines for the Commonwealth of Pennsylvania, in a letter to all mine inspectors, mine officials and mine workers, offered congratulations on the fact that during the month of July there had been only one fatal accident attributable to a fall of roof in the State's coal mines.

Throughout the nation, State and Federal authorities have enlisted the help of all those concerned in the mining of coal in an all-out drive against roof fall accidents, the Number One killer in coal mines. Pennsylvania's record is one for mining men in every State to shoot at. Figures for the first seven months of 1953 and 1954 showing the State's progress are compared below.

	Total Fatal			Fatal Roof Falls		Tons Mined Per Fatal	
	Anthra- cite	Bitumi- nous	Anthra- cite	Bitumi- nous	Anthra- cite	Bitumi- nous	
1953....	41	39	30	22	430,290	1,350,517	
1954....	28	28	19	11	514,120	1,398,172	

May we add our congratulations to those of Secretary Clements, and at the same time join him in urging mine inspectors, mine officials and mine workers throughout the industry to strive for even better records in the future.

Coal mining can be a safe occupation but only eternal vigilance on the part of every individual in the industry can make it so.



In the foreground can be seen the East Portal of the Allen mine. The West Portal is about two miles further up the valley. In the background is the Sangre De Cristo Mountain Range.

Mine Coking Coal in Colorado

**How Modern Mechanical Methods Speed Production,
Lower Costs in CF&I's New Allen Mine**

By ROBERT L. HAIR

General Superintendent
Coal Mines
The Colorado Fuel and Iron Corp.

RECENTLY The Colorado Fuel and Iron Corp. opened and put into operation a new coking coal mine in southern Colorado. Called the Allen mine in honor of Charles Allen, Jr., chairman of C. F. & I.'s Board of Directors, the mine is located in the Stonewall Valley, about 30 miles west of Trinidad, Colo.

It is served by the Colorado and Wyoming Railway, a subsidiary company of The Colorado Fuel and Iron Corp., which, in turn, connects with the Denver and Rio Grande, the Colorado and Southern, and the Santa Fe Railroads at an interchange point near Trinidad.

All of the coal produced at the Allen mine is shipped to the corporation's by-product plant at the Minnequa steel mill, Pueblo, Colo., for cleaning and conversion into metallurgical coke.

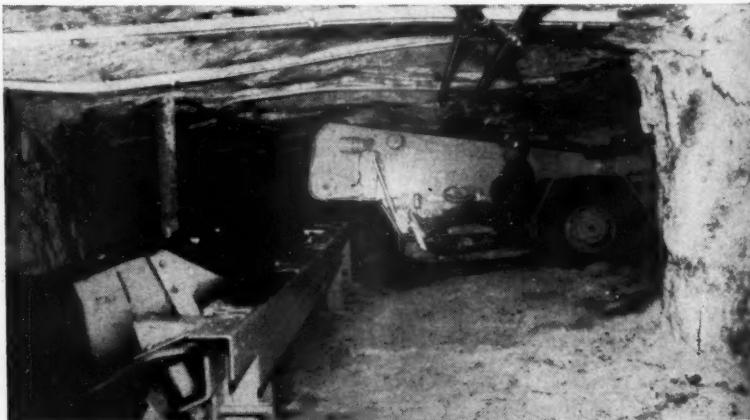
Mining Virgin Seam

The Allen seam being mined is a virgin seam in the upper series. It lies about 1200 ft above the Trinidad Sandstone and is from four to six ft

thick. Average thickness over most of the area is 60 in. of minable coal overlain with drawslate from an in. or two thick up to as much as 18 in. The drawslate weathers on exposure to the air and is not firm enough to be held in place. The stratum above the drawslate is predominantly black or coaly shales or sandstone.

Occasionally the stratum overlying the drawslate will vary from a good sandstone to a soft, wet, shaly formation with many hidden slips and faults in which it is not possible to properly anchor a roof bolt. Roof of this kind presents special problems, even with conventional timbering, and fortunately is encountered only occasionally. Cover over the Allen Seam varies from 400 to 1100 ft, except when approaching the western outcrop. Average cover is about 550 ft.

The coal seam pitches almost due east and the north-south strike is parallel to the mountain uplift. At the western coal outcrop, the pitch is as great as 35 percent, decreasing gradually so that within a mile east of the outcrop the pitch is from two



Six-ton capacity shuttle cars haul from loading machine to a 30-in. belt in the East Portal mine

Adapted from a paper presented before the Rocky Mountain Coal Mining Institute, June 1954.

to four percent. Local undulations of the strata and faulting occur, which cause local grades up to as much as eight percent over or under the average.

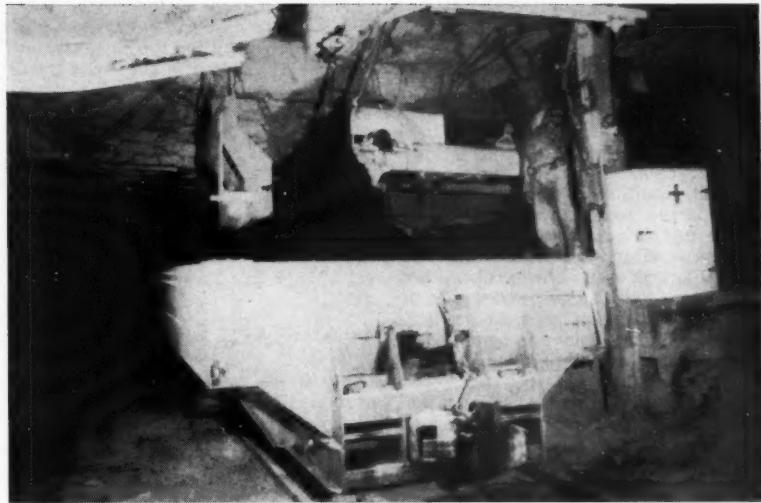
Use Two Portals

Since approximately one-fourth of the coal reserves in the area to be worked lie in the western portion of the mine, it was decided to bring the coal to the surface at two points on the property.

One opening, the West Portal, has been driven at the outcrop of the Allen Seam. At the second opening, the East Portal, coal is reached through a 1500-ft rock slope having a grade of 30 percent. The East Portal is about two miles east of the West Portal. In time both mines will be connected underground. All coal which pitches very much over 10 percent, that along the western outcrop, will be mined from the West Portal.

The West Portal slope mouth is 7645 ft above sea level, and, since the hills to the north and south rise another 800 ft, the outcrop extends a considerable distance west of this portal. It was, therefore, possible to drive the first strike entries south from a point near the slope mouth. Thus, at the West Portal there is a drift opening driven south on a grade averaging two percent, as well as the main slope in the coal seam which is projected almost due east to connect with rise entries driven west from the East Portal workings. The slope entry starts out in the coal seam at a pitch of 15 percent.

Slope projections at Allen call for seven entries on 70-ft centers. Other sets of north and south strike entries—secondary entries—will be driven in sets of four or five on 70-ft centers. Panel entries driven west—up the pitch—will be in sets of three on 60-ft centers. All main, secondary, and most of the panel entries will be roof bolted.



A panel belt to mine car loading point in the East Portal mine. Cars are handled under the loading point by car-puller hoist or gravity depending upon grade

The East Portal mine entrance consists of two parallel rock slopes driven on a 30 percent pitch to intersect the coal seam at an elevation of 7060 ft. Track has been laid in one of the slopes. Through this slope, men, materials and equipment are handled by rope haulage from a hoist on the surface. The parallel belt slope, 80 ft to the left, contains the main belt conveyor for hoisting coal and rock. The slopes are eight ft high by 12½ ft wide, and are roof bolted and then gunited for their entire length. Three crosscuts were driven in the rock at approximate 400-ft intervals for cross travel between the slopes.

Will Connect Underground

This then is the picture at the present time. The Allen Seam is positioned something like a slightly tilted saucer. The upturned edges of the saucer represent the outcrop area

where coal pitches as much as 35 percent to the east. The flat part of the saucer represents most of the coal seam which pitches between two and four percent to the east. Coal is being mined through two portals. One is located on the outcrop, or on the rim of the saucer, where a 15 percent slope follows the coal underground. The other opening is over the flat part of the saucer and about two miles directly east. Here the coal seam is reached through a long rock slope. Presently these portals represent two independent operations. The workings will be connected underground when the West Portal slopes are met by the East Portal slopes now being driven up-grade. The West Portal slopes have been stopped because some water is being made.

Coal pitching over 10 percent will be mined through the West Portal while that under 10 percent will be mined through the East.

Mining Method

The mining method employed at Allen mine so far has proved satisfactory with regard to (1) roof action, (2) room development, (3) pillar recovery, and (4) ventilation. Management feels that reserves of good coking coal are rapidly being depleted, and that it is essential, wherever possible, to get as complete recovery as good mining practice will permit. Rooms are driven on 60-ft centers, 12 to 14 ft wide for about 100 ft and then widened to 24 ft. Crosscuts are turned every 70 ft. Rooms are driven 290 ft deep, and pillar retreat is begun by driving through the 36-ft pillar, leaving a six to eight-ft fender. The fender is recovered as the machine retreats and affords protection for the men and equipment until the coal is totally extracted. When driving the room up, some posts are set along



In the West Portal mine, where the coal seam pitches from 15 to 18 percent, chain and bridge conveyors are used to transport coal from loading machines.

the gob side to act as indicators of roof weight, but wedge-type roof bolts with three by five by 18-in. cap pieces set four ft apart are the principal means of roof support.

Pneumatic stoppers, impact wrenches and dust collectors are used in roof bolting. Split rod and wedge type bolts are used, generally in lengths of four, four and one-half and five ft, depending on the nature of the strata overlying the drawslate. Bolts five and one-half and six ft long are kept available and used occasionally. Cap pieces are used as bearing plates in entries and rooms with short life. In main entries which will be used for many years, 12 ft long four-in. steel channels are bolted to the roof.

The Allen Seam can be drilled satisfactorily by hand-held pneumatic coal augers using tungsten carbide bits. Three holes are normally drilled in a 14-ft entry, and the total charge of permissible powder is approximately 4½ lb. One instantaneous blasting cap followed by delays are used for detonation, induced by a dry cell permissible blasting unit. Shot holes are drilled by the cutting machine crew before cutting.

Drawslate A Problem

A universal cutting machine cuts in the few inches of bone and coaly shale immediately below the drawslate. The drawslate falls and is scraped out of the cut by the cutter bar. Most cutting is done in this manner. However, where the good roof extends right down to the top of the coal, the coal is undercut and sheared. An entry may have as much as 12 in. of drawslate, and the parallel entry 70 ft away, may have no drawslate. Where top cutting in drawslate is done, the place is not sheared, as the coal from the shear cut would be mixed with the drawslate and loaded out as waste. This top cutting procedure naturally requires two trips for the loading machine into a working place for every nine ft of development or pillar recovery.

During the mining cycle, the loading machine first loads out the drawslate removed by the top cutting operations. The lodger is then withdrawn from the working place, and the coal holes are blasted, either by the loading machine crew or the cutters, whichever has the most time to spare. In undercutting and shearing operations, however, drilling and blasting is done entirely by the cutting machine crew.

Coal is transported by shuttle car at the face in all working places, except panel entries in the West Portal mine.

Mining Pitching Coal

In driving West Portal panel entries, where the pitch of the seam is around 15 to 18 percent, chain and bridge conveyors in each entry are used for transporting the coal from the loading machine. It is too hazardous to operate shuttle cars on this grade for very long distances. The conveyor on the middle entry feeds direct onto the panel belt. The other two chain conveyors feed onto cross conveyors, which in turn discharge on the panel belt.

Because of the severe grades, a shortwall cutting machine is used instead of a universal cutting machine. The shortwall is transported from face to face on a crawler equipped truck.

The discharge boom of the loading machine has been reduced to eight and one-half ft. The drive end of the bridge conveyor is attached to the end of the loading machine boom and the discharge end is attached to a dolly which rolls along the top of the room conveyor. Combined length of the loading machine and bridge conveyor is 46½ ft—long enough to drive cross-cuts about half way through.

Panel belts are used in lengths of from 1500 to 2000 ft, with the average belt conveyor length projected for 1500 ft. The underground panel belt conveyors are 30 in. wide. The belt is in sections of 200, 400 and 600 ft, allowing for advance or retraction of the conveyor of 100, 200 and 300 ft,

whichever is most advantageous at the time.

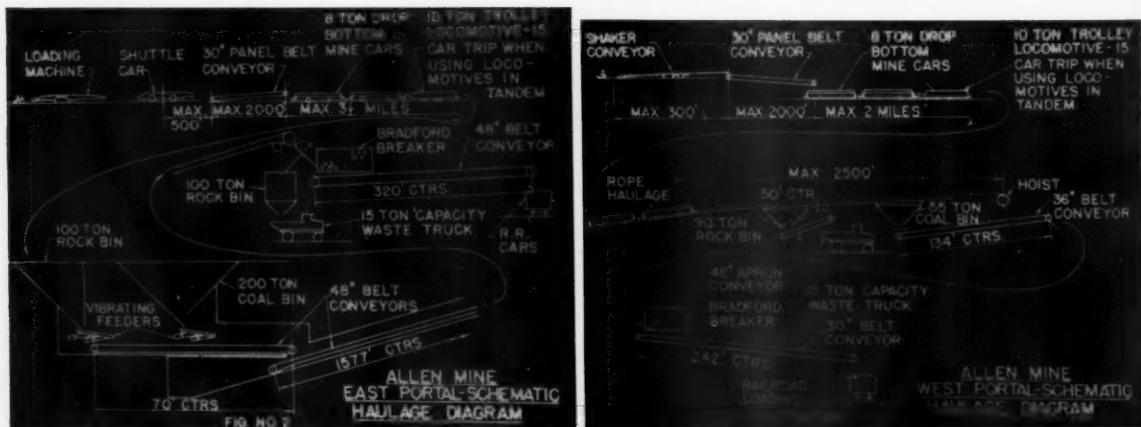
Where the panel belt conveyor is used for lowering coal on pitches in excess of 10 percent and up to 30 percent, the conveyor, which is driven by a 50-hp motor at 250 fpm, is provided with a magnetic brake activated by a solenoid switch and a centrifugal roller switch for overspeed protection. The drive control in this case is reversible, allowing for reversing of the conveyor in order to transport materials and equipment uphill.

In sections of the mine where the grades are less than 10 percent, no overspeed device is used on the panel belt conveyors. These belts are non-reversible, no supplies or equipment are transported inby on them. In such sections, battery-powered trucks with trailers are used for hauling materials and supplies.

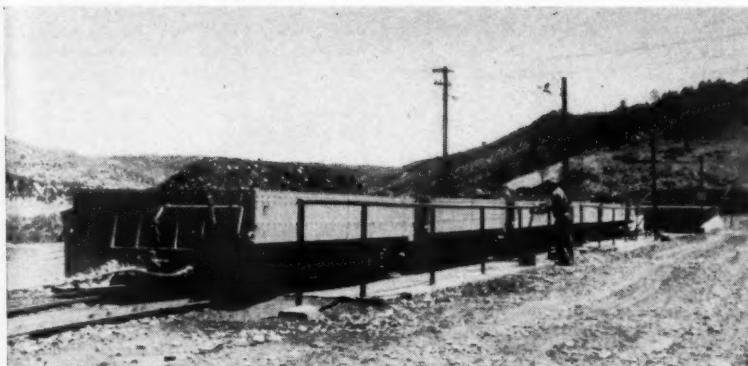
Track Haulage

In both mines, main line haulage is by track. Eight-ton capacity bottom-dump cars are used. The 21-ft all-steel cars are equipped with automatic couplers and parking brakes. Track gauge is 48 in. All haulage roads are laid with 90-lb iron with the exception of side tracks at the loading heads and surface tracks. Here 45-lb rail is used. Mine turnouts are made with standard AMC switches with cast manganese frogs, Nos. 4, 5 and 6. Minimum turnout radius is 128 ft. Other curves have as great as a 500-ft radius. Track on trolley locomotive haulways is bonded and cross-bonded with 4/0 bonds welded to the rails.

All track leading to the dump pockets at the bottom of the East Portal shaft is laid out with the view of handling 3000 tons of material per shift with the least conflict between empty and loaded trips. To accomplish this, empty and loaded tracks are separated for over 1000 ft on each side of the dump pockets or to the point where trips will come from north, south, east or west sections of the mine.



Schematic diagram of haulage system at the East Portal (left) and the West Portal (right)



Trips are hauled out of the West Portal by rope haulage and emptied into dump pockets

The haulage of the mine cars underground, except for main slope rope haulage at the West Portal and man and supply slope at the East Portal, is accomplished with 10-ton electric locomotives operated either singly or in tandem, depending upon the size of trip and maximum grades to be negotiated. These locomotives are each powered by two 75 hp, 250-v, d-c motors, and have a running draw bar pull of 500 lb at a speed of eight mph. They are equipped with four 33-in. diam steel-tired wheels, hydraulic and hand-operated brakes, and dynamic braking. They also are equipped with trolley phones.

Surface Plants

Coal from the East Portal workings is brought to the surface through the rock slope. The main slope bottom consists of dump pockets and storage bins for 200 tons of coal and 100 tons of rock. The concreted opening is 120 ft long, 18 ft wide and 65 ft below the track. The roof over the coal seam is bolted and roof and sides are gunited. Locomotives pull loaded cars of coal or rock over these pockets and dump their contents into the appropriate bin. A wetting agent is used to allay any dust made in dumping.

Vibrating feeders under each bin deliver coal or rock to a shock belt that feeds the 1500-ft r.o.m. slope belt conveyor. Twin-Dual magnetic vibrating feeders are each 72 in. wide by 13 ft long. They are equipped with controllers suitable for varying the range of feed from 150 tph minimum to 700 tph maximum.

The shock belt conveyor is 48 in. wide by 70 ft long, center to center of pulleys. It is presently operating at a belt speed of 300 fpm to deliver 350 tph of coal or rock to the main slope belt conveyor, with an ultimate capacity of 700 tph at a belt speed of 400 fpm. A tramp iron detector is installed on the shock belt to detect metal objects in either the coal or rock before they harm the main slope belt. The shock belt travels over a set of magnets that are arranged to stop the belt electronically when drill steel,

roof bolts, or other metal objects are present in either the coal or rock, at the same time sounding an alarm.

The main slope belt conveyor, which receives the coal and rock separately from the shock belt conveyor, conveys same up the 30 percent inclined belt slope into the surface plant. The belt is 48 in. wide and 1577 ft long, terminal centers, with a gravity take-up at the lower end. The belt is presently operating at a speed of 300 fpm to handle 350 tons of material per hour by a 250 hp, 440-v a-c, 900 rpm motor through a triple reduction speed reducer. Later on, when mine output is increased, this motor will be replaced by a 450 hp, 1200 rpm motor to give a conveyor capacity of 700 tph at 400 fpm belt speed.

Coal is discharged from the r.o.m. belt to a six by 14-ft vibrating screen in the preparation plant, which separates r.o.m. product at three and one and one-half in. Plus three-in. may be delivered to a house coal bin, or it may be combined with the 1½-in. fraction and delivered to a nine by 22-ft rotary breaker for crushing and rough cleaning. The minus 1½ in. from the screen bypasses the breaker. Refuse from the breaker discharges to a 25-ton bin, from which it is loaded into a truck and hauled

to a disposal area. Reject averages about four percent of r.o.m. product. The minus 1½-in. crushed-picked product of the breaker joins the bypassed minus 1½-in. size from the vibrating screen and is conveyed by a 48-in. belt conveyor to loading chutes over three railroad tracks. Loading chutes allow for loading on any of the three railroad tracks through the use of push-button controlled flop gates in "pants" type chutes. A similar arrangement is available for changing flow between cars without spillage and without interrupting the flow of coal. Cars are dropped under the loading chutes with the use of two air-controlled car droppers; an electric car-puller is used in bad weather.

All equipment is electrically controlled and is so interlocked that if one unit fails or otherwise becomes inoperative all preceding units will stop. One operator at a panel board in the breaker house controls all of the units.

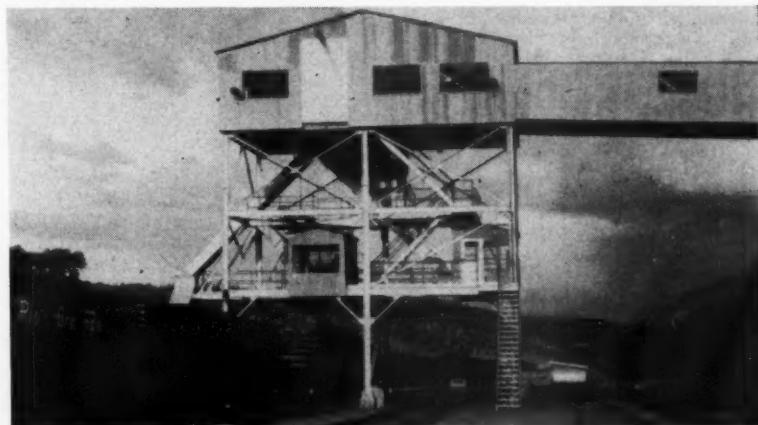
At the West Portal, coal is taken out of the mine by a rope hoist.

Raw coal is dumped from eight-ton drop-bottom mine cars into a 55-ton storage pocket, from which it is conveyed by a 36-in. belt conveyor to a nine by 17-ft rotary breaker for rough cleaning and crushing. Minus 1½-in. crushed product then is moved by a 30-in. belt to the loading bay for discharge into railroad cars on two tracks.

Mine rock is dumped into a 90-ton capacity storage pocket, from which it is elevated by an apron conveyor to a discharge chute. A 15-ton end-dump truck hauls the refuse to a disposal area. In general, preparation and loading facilities of the West Portal are similar to those at the East Portal.

Use A-C Underground

Power for the Allen mine is received from the Frontier Power Co. of Trinidad, Colo., at the two substations of the mine located at the West Portal and the East Portal. Power is delivered to the mine as 44,000-v 3-phase 60-cycle current.



A view of the East Portal tipple and loading tracks

The East Portal substation has one 1000-kva 44,000/4160-v, and two 500 kva 44,000/480-v 3-phase transformers. Until some time in the future, when the East and West Portal entries of the Allen mine connect, each portal will have its own power source.

Power for underground use is taken into the mine from the surface substation at 4160 volts by a 2/0, three-conductor cable. There, 300-kva portable three-phase transformers convert the 4160-v a-c power to 480-v a-c for use of the mining equipment. Feeders off of the power-center transformers are 500,000 cm in size, and individual 4/0 three-conductor cables are used to take the power to the panels. All the underground a-c power lines are on a grounded neutral system.

The 275-v d-c power for the trolley lines is provided by 300-kw mercury-arc rectifiers. A 750,000-cm bare feeder wire parallels the 6/0 grooved trolley wire. The negative side of the system is provided by the haulage track bonded and cross-bonded. The 300-kw rectifiers also supply d-c power for most of the shuttle cars. There are also two 30-kw 440-v a-c to 275-v d-c selenium rectifiers, each of which is capable of providing power for two shuttle cars.

Ventilation

Air is furnished each mine by two seven-ft axial flow mine fans operating exhaust. Both fans are presently being driven by 50-hp motors. Ultimately 150-hp will be used. Quantity of air at present at East Portal is approximately 100,000 cfm at 0.5-in. water gauge. At the West Portal 125,000 cfm of air is being delivered at a water gauge of 1.2-in.

Power is received at the fan houses from the 480-v side of the substations through a 4/0 cable.

An outstanding safety feature of the fan installations is the constant availability of an auxiliary drive for each of the fans. Should an interruption of power from the main source occur, a diesel-powered motor would automatically be started and, through the use of specially designed couplings, the fan would be returned to active service. The time lag between electric-motor failure because of a power outage and the time the fan is brought into service by the diesel-motor drive is only a matter of a few minutes. Fan motor failure is also accompanied by the sounding of a warning signal in the industrial building at each portal.

The airshaft at the East Portal is 400 ft deep, circular, 14 ft in diam, and concreted from top to bottom. The West Portal airshaft is of the same construction, except that it is only 40 ft deep.

Concrete block stoppings are used to conduct air in all main and secondary entries, and are kept within 200 ft

of the faces at each mine. Line brattice is used to ventilate face regions.

The panels, the belt slope and pockets and each mining district in the East Portal mine are ventilated by separate splits of air by overcast exclusively. No doors are used on haulageways. No blower fans are used at the Allen mine.

Surface Shops

At each portal there is an industrial group building which houses surface facilities. Both house a stoker-fired heating plant, miner's shower and change rooms, lamp room, mine foreman's room, storehouse and mechanical, electrical and blacksmith shops. The mine supply tracks extend into the shops so that heavy equipment can be conveniently spotted for repairs.

An unloading dock and supply railroad track extends along the north side of each building for easy handling of material and supplies from railroad cars. A 12-ton diesel locomotive on mine track gauge is used at each portal for handling supplies on the surface.

At both the East and West Portals, well-drained and well-lighted concrete underpasses are provided for travel of workmen from the parking lots on the north side of the railroad tracks into the change rooms in the industrial buildings.

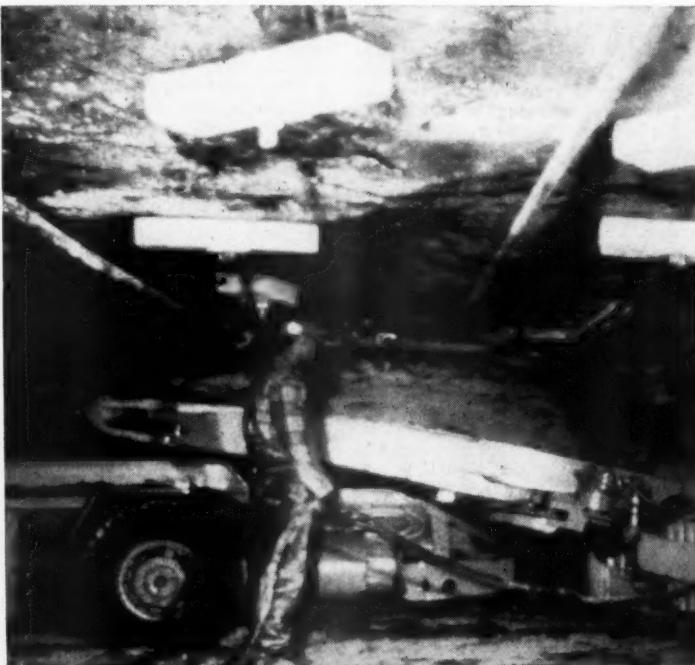
Safety

Safety is a major consideration at Allen mine. Adequate clearance with respect to underground haulage and the careful guarding of electrical con-

ductors is apparent throughout the mine. Standards are set up for roof supports, for both roof bolts and timbers, such standards being based on study of prevailing conditions and on experience. Rock dust is distributed by rock dusting machines, and the amount of rock dust distributed will approach five lb per ton of coal mined. Water is piped to all working places, and the coal is sprinkled in order to allay the coal dust made in cutting and loading operations at its source.

One hundred percent voluntary First Aid training of all mine workers and supervisors, totaling around 1250 men, was recently completed at the Colorado Fuel and Iron Corp. coal mines. This was accomplished through the excellent cooperation of the United Mine Workers of America, the U. S. Bureau of Mines, Trinidad Junior College and the company's management and supervisory staff.

A Joseph A. Holmes Safety Chapter has been active at Morley mine (one of the three mines that C. F. & I. operates) for over 20 years. Recently chapters have been organized at Frederick and Allen mines through the cooperation of the mine workers, Bureau of Mines and company officials. The instruction received in the first aid classes, along with the open and honest discussion of accidents and the other safety information available at the Holmes Safety Meetings, will be of great benefit to this large number of men, and will undoubtedly result in a constantly improving safety record.



Prevailing roof conditions determine whether roof bolts or conventional timbers are used for support

Minerals and Western Hemisphere Defense

A Champion of Domestic Mining Takes A Realistic Look at a Vital Problem

By HON. GEORGE W. MALONE

U. S. Senator from Nevada

AMERICAN mining received what the *New York Journal of Commerce* truthfully declared "a tremendous shot in the arm" when the 83rd Congress approved two measures that halted what might be termed the ebb tide of mining. Those two outstandingly important measures were the granting of depletion allowances of 23 percent to 32 critical minerals, and the killing of a provision for sponsoring mineral exploration and development in foreign countries by the Foreign Operations Administration.

Both those steps were the result of the findings of the Senate Minerals, Materials and Fuels Economic Subcommittee, which completely disproved a long-current theory that the United States is a have-not nation as regards critical materials.

In its findings the committee demonstrated:

(1) The Western Hemisphere can be defended and will be the only "dependable source" to the United States of critical raw materials in the event of a third all-out war.

(2) During the last quarter century established procurement policies have dangerously increased our dependence for critical materials on nations across major oceans. Such dependence on overseas suppliers must be avoided.

(3) Less than one percent of the area of this nation has been included in geological investigations; only 12.7 percent has been geologically mapped, and 31.1 percent topographically mapped by the United States Geological Survey.

(4) Federal tax laws definitely retard the production of critical materials in this nation.

Given reasonable depletion allowance, such as the new code provides, and a tariff or duty based on fair and reasonable competition, private industry will explore, discover and develop our natural critical and strategic mineral resources, to the extent that they may profitably do so in competition with producers in low-wage, low-tax foreign and remote areas of the world.

But one step further must be taken to assure our complete national self-sufficiency that would safeguard us in time of war.

The workingmen and investors in our critical and strategic minerals industries must have equal access to our own markets, stockpiles, defense plants and arsenals with the minerals and materials of other nations. Such equal access is denied them now through the 1934 Trade Agreements Act—the so-called reciprocal trade.

They do not have such access because neither tariffs nor duties on imports of such minerals and materials equalize the difference in costs of production between this nation and the foreign producers competing for our markets against American producers and American products.

Foreign producers in the past 25 years have not had to compete with American producers in reality. They have had the benefit of millions of dollars in American foreign aid, coupled with reduced duties or tariffs, to give them a preferential right-of-way into the American markets. The American subsidies and reductions in duties they have received more than counterbalance any transportation costs in shipping materials to the United States.

They have been given funds with which to explore and develop foreign properties. They have been given expert technological advice at the expense of American taxpayers on how to exploit these foreign properties. They have been given equipment to operate these properties, and great electric projects, financed at American taxpayers' expense, have been built to provide these foreign interests with the electric energy necessary to operate the equipment we have given them.

It was that international mining boondoggle which was stricken out of the foreign aid bill as a step toward ending discrimination against our own producers.

The provision for depletion allowance was another step, and the third



and final step will come when the Congress returns to the United States Constitution, Article I, Section 8, and levies tariffs on imports of foreign minerals and materials based on fair and reasonable competition equalizing the difference in low wage and low tax rates in foreign countries and high wage and tax rates in the United States.

The American mining industry finances its own exploration. It finances its own development. It finances its own research. It risks its own money, and often in huge amounts, instead of asking for handouts from the Foreign Operations Administration or Mr. Stassen at the expense of American taxpayers, as do their foreign competitors.

The American mining industry pays the highest wages for comparable work in the world, while the foreign producers who have benefited most from American aid pay the lowest wages in the world.

The American mining industry, heretofore starved between wars, has come to the rescue of the United States in two world wars, supplying our needs for critical minerals and materials when the rest of the world was cut off by the enemy.

The mining industry of the Western or American Hemisphere—North, South and Central America—can and will supply our full needs for critical and strategic minerals, materials and fuels in the event of another all-out war if given free and equal treatment with the rest of the world.

And in the event of such an all-out war only that mineral wealth lying within the American Hemisphere will be immediately accessible for our war needs.



Crescent Mine is on Big Creek, a branch of the South Fork of the Coeur D'Alene River

Sinking the Crescent Shaft

Mechanization, Good Planning and Incentive Bonus System Contribute to New Speed Record for Coeur D'Alenes

By S. W. McDougall and E. B. Olds

THE Crescent Mine, wholly owned by Bunker Hill and Sullivan, is located at the eastern end of the Bunker Hill and Sullivan property on Big Creek, a branch of the South Fork of the Coeur d'Alene River. It is about four miles east of the Bunker Hill Mine at Kellogg and about one mile west of the Sunshine Mine. The mine has a history of limited production over a period from 1917 to 1942 when, due to exhaustion of known ore reserves and lack of manpower during the war years, it was abandoned. The major opening was an adit 4000 ft long, driven westerly from Big Creek Canyon at an elevation of 2709 ft above sea level. This adit connected with a three-compartment shaft, already down to the 1200-ft level with a sump 75 ft below that. Several thousand ft of cross-cutting and drifting with considerable stopping had been done between the adit level and the 1200-ft level, and all

these openings were full of water to the shaft collar. It was calculated that the mine contained more than 8,000,000 gal of water. Buildings at the portal of the tunnel were in repairable condition for dry house, storage facilities, timber framing shop, etc. Suitable arrangements were made for bringing supplies from the Bunker Hill shops, warehouses and yards by truck, with the aid of mechanical handling. Shop facilities were not considered necessary, as all such work could be handled by the Bunker Hill shops.

Since it has been the history in the Coeur d'Alenes that the more valuable ore deposits lie at depths of about sea level, it was desired to explore this area at that horizon or lower. The desirable horizon was finally set at 400 ft below sea level. This meant that the property buildings, adit, etc., must be repaired and reconditioned; the shaft unwatered and deepened by

2000 ft to reach this level and give adequate room for sump and pocket.

Since the Crescent had been a producing mine, pockets, hoist station, rope raise and such facilities were already installed at the collar. However, all timber above the water level was badly decayed and had to be replaced.

The original hoist which had been leased to another operator in the district was recovered but needed a major overhaul.

This hoist was a 2300 v., 250 hp, double drum machine with dynamic braking, a rope pull of 13,785 lb and a speed of 800 fpm.

An application was made for a loan under the Defense Minerals Exploration Act, which was approved and signed on February 25, 1953.

Start Pumping

The unwatering was done with a Pomona deep well type pump mounted with shoes to fit the shaft guides which had been left in place when the shaft was abandoned. Since the main hoist was not yet installed, a Coeur d'Alene Hardware & Foundry Co. 40 hp, single drum hoist was used temporarily, to transport men and supplies, and to make repairs during the unwatering. The Pomona pump was 100 hp with non-overloading characteristics and was rated at 700 gpm at 400-ft head. By putting compressed air jets in the

water column at intervals, a good capacity was maintained to the 800-ft level. There a pump of 800-ft head and 500 gpm capacity was installed to relay the water to the top, and the Pomona was used to pump to a temporary sump formed by damming the end of a cross-cut on the 800-ft level. When the shaft was completely unwatered, a 320 gpm, 1250-ft head, 150 hp Ingersoll-Rand pump was installed on the 1200-ft level, and all water was relayed from that level to the shaft collar.

Since no hoist was available for lowering the Pomona pump during the unwatering, two lightweight, 5-ton chain hoists with 40-ft lift chains were used with loops clamped on a cable which supported the weight of the pump from the collar station. These were later moved to the 800-ft level where the process was repeated to finish unwatering to the 1200-ft level.

The shaft timber and guides were all in good condition where under water, but all steel, hangers, lag bolts, pipe, etc., were completely corroded and had to be replaced.

A 20-in. Naylor spiral weld ventilation pipe, a six-in. air line, and a six-in. water column were installed as the water level was lowered in the shaft, and a 15 hp blower was run constantly to be sure that no bad air or gas could accumulate. Two Ingersoll-Rand 90 B compressors with two small receivers and a water-cooled after-cooler were installed at a suitable location underground, near the collar of the shaft.

Attached under the 40-cu ft skip was the cage. Two $\frac{5}{8}$ -in. wire ropes, 28 ft, 3 in. long, attached under the cage supported the floating cross-head. Two 12-ft sinking bucket chains were attached to the ends of these ropes.



A shaftman operated the mucking machine

Use Power Feed Drifters

Ingersoll-Rand DA 30 power feed drifters were used to drill the shaft rounds. Two drifters were mounted on a three-in. pneumatic column placed horizontally across the short axis of the shaft. To support one end of the column and prevent it from rotating, one end was equipped with two steel pins, which were inserted into short holes drilled into the wall; the other end had the conventional single point stinger. A complete bench round of 30 holes was drilled from one set-up of the column. Ingersoll-Rand 1 $\frac{1}{2}$ -in. Carset bits were used on 1 $\frac{1}{2}$ -in. round, lagged, hollow drill steel.

Three lengths of drill steel were used with 30-in. changes. The third,

or longest, steel was 8.5 ft. The average bench round broken was 6.2 ft.

To start a hole, a 2 $\frac{1}{2}$ -in. jack bit was drilled into solid rock. Casing cut from old two-in. pipe was driven into this hole.

Air pressure at the compressors was kept between 110 and 115 psi. Four shaftmen did the drilling. During the drilling time the skiptender hoisted broken rock from the intermediate dump pocket to the collar pocket.

Below the intermediate dump loading pocket, in one compartment of the shaft was placed a removable timber bulkhead; in the other compartment was an easily opened, tightly fitted, steel deflection door. The hoisting compartments were smoothly lined between the loading lip and bulkhead. This protected the crew drilling on the bottom from any falling rock caused by spill while loading or hoisting muck.

Drilling time averaged about two hr.

Blasting was done with 45 per cent semi-gelatin dynamite, and Dupont electric detonators fired by a Condenser Discharge Blasting machine.

Just before the blast, the ventilation was set to exhaust air from the bottom of the shaft. After about 30 min the ventilation was reversed to blow fresh air into the bottom.

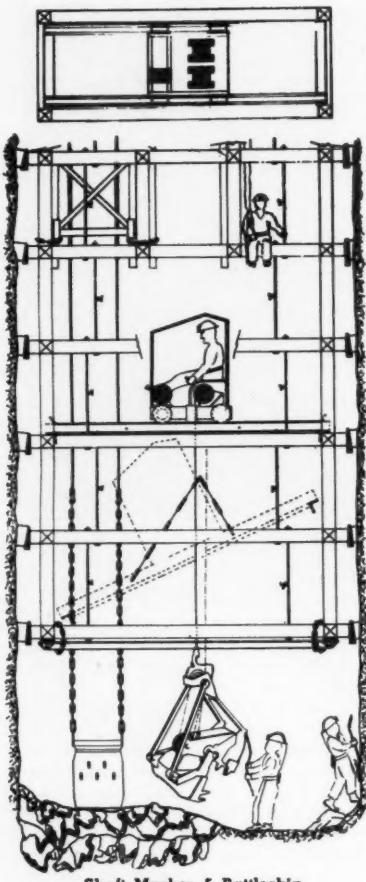
A steel blasting set or "Battleship" was used to protect the bottom timber from flying rock. It was held against the bottom of the lowest shaft set by four chains tightened with wedges.

Hoist Rock in Two Stages

As hoisting from a depth of 3200 ft was extremely slow and the bucket size was limited, it was obvious that removal of broken rock would be very slow if it were brought all the way



Clamshell bucket cleaned up bottom of shaft—discharged into sinking bucket



Shaft Mucker & Battleship

to the collar in the sinking bucket. To help speed the removal of this material, it was decided to dump the sinking bucket into a loading pocket at an intermediate point, and resort to skip hoisting from this point to the collar skip pocket on the tunnel level, without interfering with other work being done in the bottom.

The intermediate dump was first installed on the 1200-ft level and later moved to the 2000-ft level. The greatest distance the broken rock was hoisted in the sinking buckets was 1275 ft.

Muck Rock Mechanically

A Riddell Mucking Machine, of a type developed in the Coeur d'Alenes that was used satisfactorily in sinking several deep shafts in the district, was purchased from another operator and rebuilt in the Bunker Hill shops to fit this particular job. A Blaw Knox $\frac{3}{4}$ -cu yd clamshell bucket was purchased for this machine.

During the mucking cycle a skipper operated the intermediate dump and a shaftman operated the mucking machine. Another shaftman was stationed just above the mucker carriage to ring bells and to see that the bucket

cleared properly in and out of the bottom. Two shaftmen stayed in the bottom. One "tagged" the clam shell bucket (rotated it when necessary by means of a rope) and the other barred and picked down loose from the walls. The total mucking cycle took about two hr.

The over-all dimensions of the shaft timbers were 5 ft 10 in. by 15 ft. The sets were placed on 5-ft 6-in. centers.

A complete set of timer was lowered from the collar in one trip. The two wall plates were hung under the cage on timber clevises. The end plates, posts, panel lacing, blocks, and wedges were loaded in the sinking bucket and on the cage.

The blasting set or "Battleship" was also used as a timbering platform. It was lowered by hooking four chains on the rim of the center shaft compartment bucket, and then suspended from the bottom set on four chains. Lagging across the "Battleship" was used as decking for the platform.

Bearing sets were installed every 400 ft. A bearing set consisted of a standard shaft set supported by eight 1½-in. rock bolts.

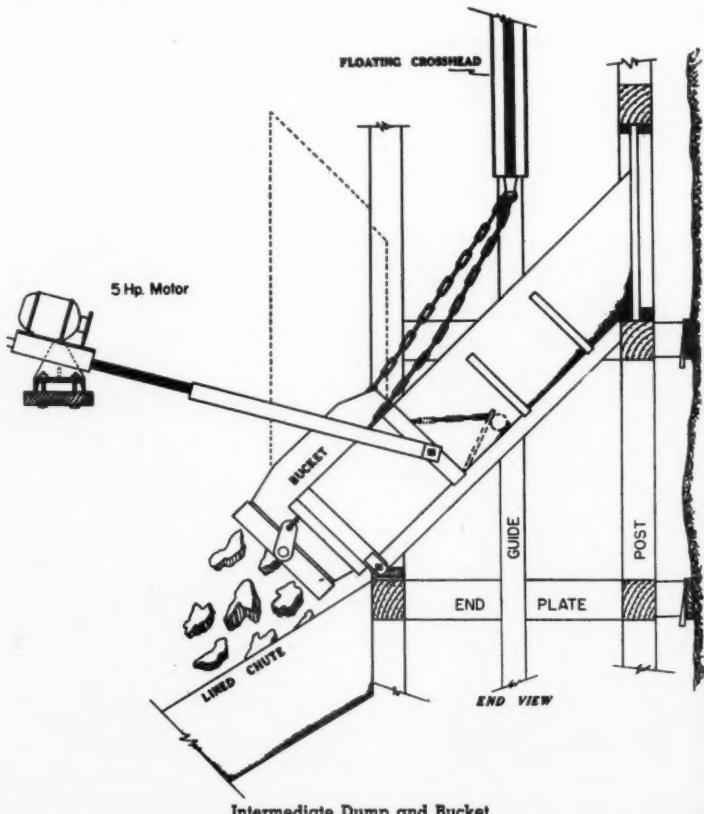
The shaft made only about 10 gpm of water. An Ingersoll-Rand, air-driven, sump pump was used in the bottom of the shaft. Every 400-ft intermediate pump stations were excavated. Ingersoll-Rand 1½ MRV—

AVERAGE CYCLE TIME IN SINKING CRESCENT SHAFT

Drilling Cycle:	Hr.	Min.
Actual drilling time.....	2	
Loading.....	30	
Set up and tear down.....	30	
Smoke time.....	30	
TOTAL	3	30
Mucking Cycle:		
Mucking.....	1	30
Bar down and wash down wall plates.....	30	
TOTAL	2	
Timber Cycle:		
Lower "Battleship".....	12	
Hang and Block set.....	1	10
Lewer mucker.....	13	
Dividers and lacing.....	30	
Short guides.....	8	
(Third set long guides—35 minutes)		
TOTAL	2	13
TOTAL TIME	7	43
Pipe and Manway (Fourth or fifth set).....	3	

25 hp motor pumps were used on these stations, pumping from 750-gal steel sump tanks. Since the sump had only a 200-ft head, it was necessary to install temporarily a motor pump in the manway compartment about 200 ft below the lowest inter-

(Continued on page 62)



Intermediate Dump and Bucket



Let them sit in on discussions of mine policy

Are We Using Our Engineers Effectively?

Engineering Talent Is A Valuable Asset. It Is Up to the Industry to Make the Most of It

By M. D. COOPER

Director
Mining Engineering Education
National Coal Association

THE above question has been asked a good many times and answers have ranged all the way from yes, through various qualifications, to a flat no. Almost everything depends upon the disposition and experience of those who give the answers.

While the question covers the mining industry, in this article it is considered largely as applying to the coal industry.

Engineers are used in exploring property and planning its development. Much of this work may be in the province of the consulting engineer. Surveying and mapping, including the location of existing or projected structures, are usually done by the engineering department or by contract engineers. For large tracts,

aerial surveying is used in some localities. Research in methods and equipment is more and more being brought into the work of the engineer. Production and management staffs are often manned by trained engineers. Sales and uses of product are engaging the services of engineers to a greater extent than formerly. The manufacture of mine equipment and supplies is steadily becoming more technical and, therefore, requires men trained to deal with engineering problems.

Mining utilizes many branches of engineering. In addition to those who have chosen to study mining, there is a place of chemical, civil, electrical, industrial, mechanical and metallurgical engineers. Whether these men

are being used effectively, to produce a desired result, or efficiently, through the energetic exercise of their training, is the question under discussion.

Quiz Many

In order to obtain first hand information, letters were sent to mining graduates in the Classes of 1949, 1950, 1951, 1952 and 1953. Each had been designated as an outstanding student during his senior year. Heads of mining departments were asked to comment, with the knowledge that their observations covered a greater number of years of experience. In all, 45 letters were answered—34 from graduates and 11 from faculty members in colleges and universities in the major coal producing states. They had all been assured that no reference would be made to individuals, colleges or universities or employers, and that an honest expression of opinion, favorable or unfavorable, was being sought.

While some of the answers to the question, "Is the Mining Industry Using Its Engineers Effectively?" were long and somewhat qualified, it seems reasonably correct to classify them as follows:

	Yes	No
Graduates	21	13
Heads of Departments	5	6
Total	26	19

The most striking feature of the replies was the almost complete absence of reference to rates of pay, fringe benefits, security, and other items usually mentioned when young

engineers are discussed. Perhaps that may be due to the fact that they are generally not yet stockholders in large companies and do not see proxy statements! As an example, American Telephone and Telegraph Co., in its proxy statement of March 13, 1954, illustrated its Plan for Employees' Pensions, showing that those with an average annual salary of \$25,000 to \$160,000 could retire after 30 years of service with a pension of \$7500 to \$48,000. National Biscuit Co., in its proxy statement of March 5, 1954, published somewhat more modest figures, showing that an employee with a salary of \$20,000 to \$125,000 would retire after 30 years of service with an approximate annual pension of \$6000 to \$37,500.

Want Opportunity

The principal desire on the part of engineers is that they be given an opportunity to use the training they received while they were students. In some cases, they reported that they had not yet been given a job that required more knowledge than was obtained in high school. In fact, a few expressed the belief that their time had been wasted in taking an engineering course. Others stated that the so-called training that they were receiving in industry was marking time and that they were working as rodmen or draftsmen long after they had learned the fundamentals of the job and were capable of doing something more useful.

One graduate stated that, among the engineers in his company, one



Rolling coal—the symbol of high efficiency

served two years on a surveying corps and had little or no opportunity to use his own initiative or judgment on any project. Others have been similarly hemmed in. He had not done one job which he was not capable of doing before he entered college. Because of this situation, advancement was limited.

Another graduate referred to the fact that mining has become more specialized but has neglected programs in research and technical advancement. He recommended the use of engineers in dealing with problems of roof control and drainage, especially under greater depths of cover.

On the successful employment of graduate engineers, the following is an excerpt from a letter written by a member of the Class of 1949: "The

coal mining industry is learning to use its engineers effectively. Never before has any industry moved so fast in such a short time. Today the term 'engineer' around the coal mines is no longer restricted to surveyors. There is a production engineer, maintenance engineer, electrical engineer, belt engineer, time study engineer, and safety engineer. Operating jobs from president to mine foreman have been taken over by engineers.

"To meet competitive markets requires efficiency, a term that is strictly engineering. As used in mining it means producing the desired result with the minimum effort or expense. Better mining systems are being developed; more efficient machines are being built; roof control is being studied; the battle of safety is being fought hard; haulage variables are being lessened; cleaning problems are being solved. The talents of many engineers are being used to find the solutions to these problems."

Engineers Are Valuable Asset

An interesting discussion, somewhat abbreviated, was given in the following words: "To this question, I answer affirmatively. However, a limit is reached when one suggests that engineers in the mining field are being used to their fullest effectiveness by all companies employing graduates in engineering. An engineer's effectiveness decreases when it becomes necessary that he forsake sound principle for custom, tradition, or whim to obtain cooperation in a venture.

"Many mining graduates receive advice and counsel only when a costly error has been made or when they have bogged down because of inexperience or lack of information. A little guidance and counsel when the work is going smoothly would make a position more enjoyable and enable the engineer to use his ability in investigations that might lead to the creation of methods to improve efficiency and lower costs.

"There are times when the advice and suggestion of the novice engineer



Principal desire of young engineers is that they be given an opportunity to use their training



Many engineers have been lost on jobs they could do well but which prevented full realization of their potentialities

could be valuable. But often chief engineers and general managers withdraw into niches where they shun advice, certainly do not ask for it.

"Engineers have been lost as section bosses, surveyors, mechanics, and on many other jobs they do well, but which stifle development of their potential effectiveness, to the detriment of the company. Some of this may come from a lack of aggressiveness on the part of the individual; however, this very aggressiveness is often discouraged, except for use on a particular job.

"When a company employs engineers, its planning and scheduling should not be faulty. The engineers should be consulted on long-range effects of practical parts of mining but every suggestion made need not be backed up by a mandate from the chief engineer or general manager. Then the engineer can be used effectively rather than just used."

Educators Speak Up

One adverse comment was made in the following words: "In most mines, an engineer's work is considered to be surveying and mapping with an occasional simple designing job. The application of engineering principles to mining operations is often neglected. Poor mining systems are a result of this practice."

"Few mining companies use the engineer in supervision to the best advantage. This is one of the places where the technical graduate could increase the efficiency of the operation."

"Had the coal industry utilized the engineer to the extent that the petroleum industry has, there is little doubt

but that it would be in a more healthy condition today."

After analyzing the careers of his graduates in the last six years, the Head of the Mining Engineering Department in one university had to revise his opinion that graduates were not being used effectively. He concluded that they were. Of 80 graduates, 15 had changed jobs for one reason or another. The other 65, or 82 percent, appeared to be satisfied

with their work. Their employers have been making use of their knowledge and training sufficiently well to hold their interest. Even in the cases of those who changed jobs, there were not many instances that could be shown to be the fault of the employer. Thus, this educator was inclined to believe that the mining companies, in general, are doing a pretty good job of using their young engineers in a satisfactory manner.

The following comment is taken from a letter from the Director of a School of Mines:

"In a group of 215 graduates in the last 30 years, the following approximate distribution of employment has been found:

Operations, Supervision, Management	27%
Coal Property Engineering	43
Related Industries, as Equipment and Explosives	9
Mining Education and Government Service in Mining	6
Non-Mining	7
Armed Services	8
	100%

In the majority of cases, mining companies are using their engineering personnel more effectively than other industries, largely because of the limited number of mining engineers available. An exception is notable in the case of young engineers desiring to enter directly into operations. Mining laws require as many as five years of underground experience for certification as a mine foreman, with the result that a graduate may spend an unnecessarily long time doing routine labor before his services can be

(Continued on page 52)



To many, "engineer" means surveyor and draftsman



Inspiration's Main Shaft area. Coarse crushing plant is between twin shafts. Leaching tanks are in middle ground

The "New Look" At Inspiration

**Broad Approach Lets Management and Staff Foresee
Problems and Solve Them as They Arise**

IN the beginning there was the Inspiration Copper Co. with its Joe Bush, and the Live Oak Development Co. Consolidation of these properties, with the later acquisition of the Keystone together with various other additions here and there, resulted in the birth in 1912 of the Inspiration Consolidated Copper Co. This mine has, during its life, ranked as one of the great porphyry copper producers. The forward looking engineers of those early days realized that bold, new, low-cost methods of mining would be necessary to make Inspiration a success. As a result, it might be said that Inspiration became the mother of "block caving" as a method of mining. Copper was to be recovered by concentration and smelting and a 20,000-ton mill was installed. However, the concentrator operation was continued only until 1927. Then, because of the ever-increasing oxide content of the ore, milling was superseded by leaching. The leaching process adopted was developed after ten

By P. D. I. HONEYMAN
Vice-President & General Manager
Inspiration Consolidated Copper Co.

years of research and is known as the ferric-sulphate leach. In this process both sulfide and oxide minerals are simultaneously dissolved and the copper is produced as an electrolytic cathode. The 13,000-ton leaching plant built at that time has continued to serve the needs of Inspiration up to the present.

From these beginnings through 1945, there were mined from the Inspiration orebody some 109,000,000 tons of ore, from which were produced 2,000,000,000 lb of copper. But about 1946, it began to be apparent that perhaps the end might be in sight. Underground mining was becoming more difficult and production costs were soaring at an alarming rate. Further, the question of control of both grade and the ratio of sulphide-oxide content of the ore, so

necessary to the efficient operation of the ferric-sulphate leaching process by which the mixed ore was treated and its copper content recovered, was also tending to get out of hand.

Study Open Pit Methods

Facing these problems, urged on by a vital desire to perpetuate the life of the property, the company initiated a study to determine whether matters could be improved by the adoption of open pit methods of mining. It soon became evident that, by the use of modern electric shovels and truck haulage, not only would an open pit operation be feasible, but also such a method would be economic and would go a long way toward solving the vital problems of ore control. Furthermore, minable ore reserves would be increased, as fringe ore, too low in grade or otherwise unavailable to underground mining, could be included in the scope of pit operations.

From this point the initial development of the Live Oak open pit pro-

ceeded. Much of the remaining ore in this area actually came through to surface. The stripping ratio was low and some 20,000,000 tons of good ore would be made available. Plans were soon completed for the development of this pit on this basis. The necessary equipment was purchased and soon the job of building haulage roads, most of which are on a seven percent grade, and developing the ore for mining was well under way. A new primary crusher plant, with ore storage bins and railroad connections with existing lines, for delivery of pit ore to the treatment plants, was constructed. By April of 1948 the first open pit ore was being mined and a new chapter in the life of Inspiration had begun.

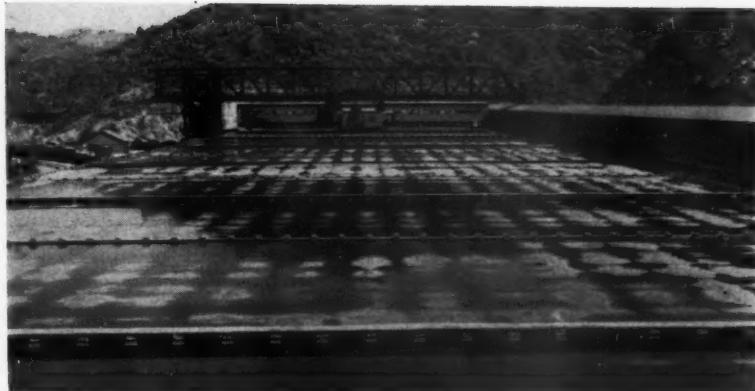
Open Thornton Pit

From that time forward both progress and expansion of pit operations was rapid. Eagerly casting an eye around the staff soon decided there were other areas in the remainder of the orebody which could be brought in as open pit operations. As it generally does, one thought led to another and by an eventual bold decision which virtually involved the moving of a mountain, the "Thornton Pit" came into existence. This pit, named after the recent president of Inspiration, W. D. Thornton, is a sizable project. In the area the ore lies deep and to uncover it, some 60,000,000 tons of waste will have to be moved. Fortunately, some of this stripping contains a few pounds of oxidized copper per ton. Waste is carefully segregated and that having an appreciable copper content is being stored in suitable disposal areas in such a way that it can be subsequently "leached in place" and much of the copper content recovered.

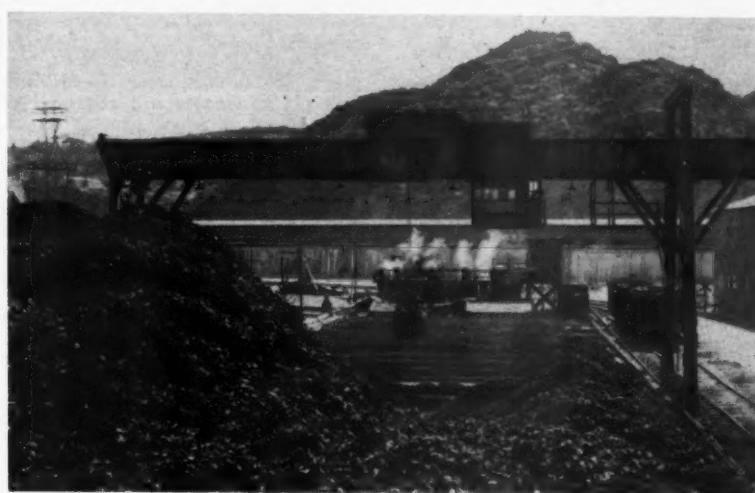
The great problem, however, in the development of the Thornton Pit was that of ore transportation. It appeared economically unsound to attempt to haul this ore by truck, up out of the deep pit, and around a mountain to the crusher plant. In fact, the entire success of the Thornton Pit proposal depended upon a solution to this problem.

Haul Ore Under Mountain

As has been described in other published paper, this problem was solved in rather a unique way. We were fortunate at Inspiration! The original main haulage level of the Inspiration mine extended out in the direction of the Thornton Pit. By a short extension of the level it was possible to get out under the pit area. Back into the picture came "block caving." A small caving block in area 65 by 100 ft was developed, and caved through to surface from which the waste had previously been stripped. Now we had the desired ore transfer system! Ore from the pit is trucked or moved by bulldozers and carryalls



Additional capacity was obtained by building walls of leaching vats 18 in. higher



Cement copper is precipitated when pregnant solution is run over iron in launders



Inspiration has 17 miles of standard gauge railroad. Diesel electric locomotives and open pit operations are controlled by two-way radio



Primary crusher and ore bins at open pit

and dumped into the transfer block. From the transfer block the ore is pulled on the grizzly level as in regular caving operations, discharged to ore trains on the 600 haulage level, and trammed to the main shaft, where it is hoisted and dumped into the main crusher plant bins. We simply found it cheaper and better to go under the mountain, rather than to go over it!

The system has worked perfectly and is capable of moving tonnage at a high rate and a very low cost. To date we have passed some 3,300,000 tons of ore from the pit through this transfer block. Operations have been simple and maintenance has been nominal. Ultimately other transfer blocks will be installed in the Thornton Pit as the developing situation demands. In the west end of the Live Oak pit a similar transfer block has recently been put into service. It, too, is working out well and ore from this area is moved underground to the Live Oak main shaft, from which point it is hoisted and hauled overland on the railroad to the main shaft crusher

plant. This arrangement in the Live Oak pit eliminates a truck haul of 5000 ft up a seven percent grade. Much of the remaining ore in the upper benches of the Live Oak pit will still be transported by truck haulage to the pit primary crusher, but ore from the lower benches will be hauled through the transfer block.

Leaching in Place

It was long known at Inspiration that much of the broken capping overlying the old caved areas of the mine had an appreciable copper content, a good deal of which was in oxidized form. By early 1950 plans had been completed for the leaching-in-place of these broken capping areas. Water supply was a problem, but this was solved by the decision to use that stored in a lake behind the leaching plant tailings dam. Actually, this lake water is on the acid side, having a pH of 2.5 and contains some ferric iron. It is pumped to a reservoir from which it flows to the leaching areas by gravity. Acid is added at

the distributing area so that the leaching solvent contains about 4.5 grams per liter of acid.

The solution is well distributed over the surface and percolates through the broken capping and is recovered on the 850 level of the mine. Concrete-lined ditches transport the pregnant solution to the pump station at the main shaft, where it is pumped to iron launders on surface in which the copper is precipitated out as cement copper. Iron launders "off" solution is returned as creek flow to the lake. This installation has been most satisfactory and to date has recovered approximately 40,000,000 lb of copper.

As previously mentioned, waste dumps containing a few pounds of copper to the ton will subsequently be similarly treated.

Metallurgical Problems

Metallurgy at Inspiration is unique in that substantially all copper is recovered by leaching. The ore is a mixture of sulphide (as chalcocite Cu_2S) and the usual run of oxide minerals, chrysocolla predominating. The leaching solvents are a mixture of sulphuric acid and ferric sulphate.

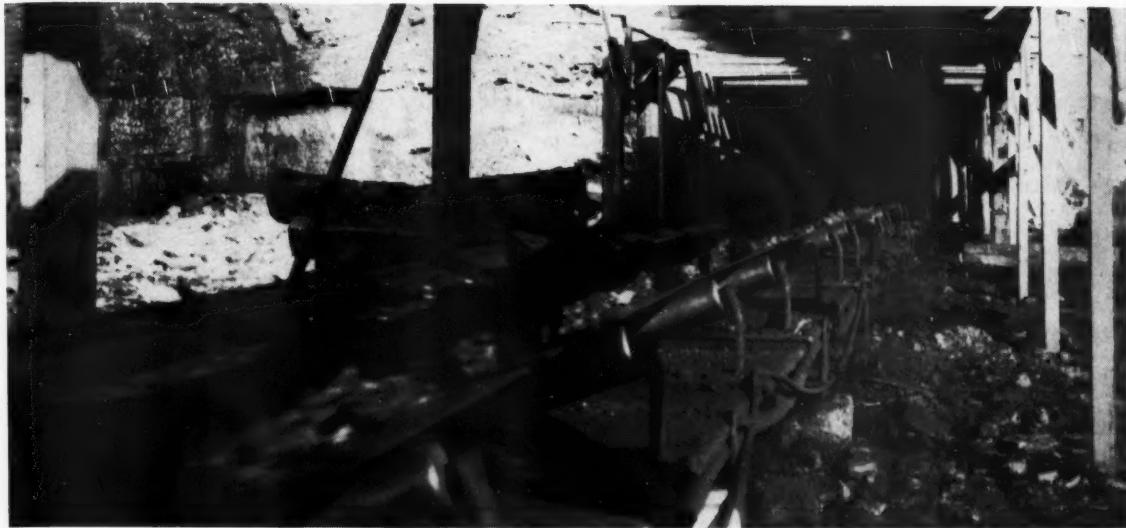
Early metallurgists, under the able leadership of the late Dr. L. D. Ricketts, planned the leaching operation at Inspiration for its treatment of a mixed sulphide-oxide ore containing about 1.2 percent copper, of which about 50 percent was in the sulphide form and 50 percent was present as oxide. Today Inspiration faces the new problems as mining progresses to lower horizons. The grade of ore is lower and the ratio is steadily swinging more and more to the sulphide side. This complicates the metallurgical problems and the trend will continue for the remaining life of the mine.

The metallurgical effort of the times is toward increasing and improving the extraction of copper from every

(Continued on page 72)



Bringing the Thornton Pit into existence meant moving a mountain



For utmost efficiency, a conveyor must be designed for a specific duty and operated within design limits

Underground Belt Conveyors

Methods of Determining Motor and Belting Requirements by Formulas and Charts Designed for the Use of Operating Men

By **J. W. HARDY**

Belt Conveyor Sales
Goodman Manufacturing Co.

UNDERGROUND belt conveyor transportation in the United States is 20 years old. It has had tremendous growth. Mining men have kept pace with their application and manufacturers have kept pace with design. However, one evident weakness in the full appreciation of belt conveyor transport is a tendency toward poor maintenance. Considering that maintenance depends on willingness and knowledge, poor maintenance can more frequently than not be attributed to lack of knowledge. The manufacturer installs the original conveyor to meet definite requirements; as mining progresses, these requirements change. From information at hand, the only way an operator can determine that his conveyor is used beyond its capacity is when the load spills or the drive motor overheats. This kind of treatment may cause short belt life, high

repair cost, and avoidable shutdowns.

There is only meager information of value available to the belt operator which will enable him to understand and compute his own belt conveyor requirements. Many articles have been published on belt conveyor costs, maintenance and specific application, but little has been published on the general fundamental belt conveyor and conveyor belt computations that is understandable to the men responsible for the underground conveyor operation. The purpose of this article is to present such information. Being able to compute his own requirements for a specific duty, a belt conveyor operator can keep his conveyor load within motor and belting capacities with resulting lower costs and better continuity of operation. The belt manufacturers have excellent handbooks on conveyor and belt design, but these books for

designers seldom reach the underground operating man, as they are too technical to be of much value to him. They are, however, of great value to the trained engineer.

Realizing the discrepancies in computation methods used by different manufacturers, the Underground Belt Conveyor Section of the National Electrical Manufacturers Association have determined a standard method of computing the horsepower requirements of underground belt conveyors. Tables relating to belting in the second part of the article have been generalized or averaged from the information furnished by the engineers of the different rubber manufacturers. Consideration of motor horsepower and belt specifications for a conveyor of known duty are closely associated. Both are dependent on the horsepower required at the belt drive pulley, or pulleys.

Horsepower Calculations

Results of horsepower calculations are frequently shown in belt conveyor handbooks in table form. So are conveyor belting specifications. Such tables are necessarily generalized to suit average conveyor requirements, and permit little consideration of special conditions that exist in practically every underground belt installation. This is especially true in determining belt specifications. Therefore, to better engineer the individual installations, formulas are used in place of generalized tables, to compute horsepower and belt specifications. Working with formulas permits the consideration of special conditions affecting factor values that cannot be taken into account if table values were used.

The following discussion on computations is based on the formula method. Several nomographs are also submitted. They are merely tables expressed graphically and are satisfactory for checking computations or estimating horsepower requirements. For close computation, however, formulas should be used. Characteristics of the expected duty requirements of a specific belt conveyor as listed below must be known before intelligent specifications can be made for the motor and belting.

1. Tonnage to be moved (a) average tph per shift; (b) maximum or surge tph. The horsepower of the driving motor electrical equipment is based on average tonnage and on continuous duty. The *maximum or surge* loading determines the necessary belt speed and width. Both (a) and (b) tonnages must be known.
2. Length of haul (center to center length of conveyor) assuming load travels full length of belt.
3. Grades—differences in elevation in feet between loading and discharge points and vertical lift of the load.
4. Weight per cu ft of broken material to be transported.
5. Size, shape and percentage of lump material to be transported.
6. Type of material to be transported.

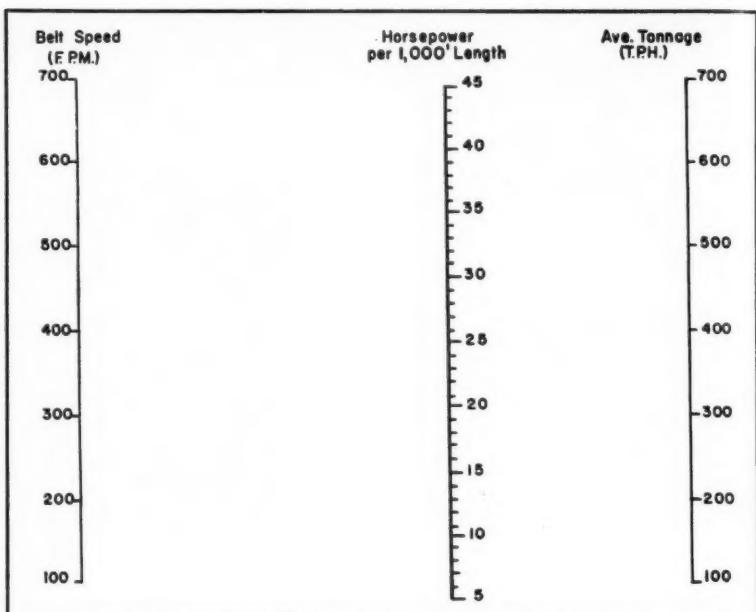
Wet or sticky material, having a tendency to stick to the belt, frequently requires a snub drive in place of a tandem so that the drive pulley will not come in contact with the dirty side of the belt.

Before formulas can be applied, the belt speed and belt width must be determined. The maximum desired belt speed determines the belt width to move a given tonnage, provided lump size is not also a determining factor in belt width. Table I shows the maximum carrying capacity of different width belts. Peak or surge capacities *must* be used to determine belt speed. Table II shows the combined weight of the belt and moving parts of the idlers, expressed in lbs per lin ft of conveyor.

The formulas given below are essentially those adopted by the Mining Belt Conveyor Section of N. E. M. A. The slight difference in presenting these formulas is in the nomenclature of the factors. N. E. M. A. averages and combines certain factors which in the following formulas are not combined.

The factors used in the horsepower formulas are:

f = friction factor. Value = 0.033
 B = Combined weights of belt and moving parts of belt idlers in lbs per ft of conveyor. (Table II)



Nomograph for determining driving horsepower per 1000 ft of 30-in. belt conveyor

L = Center to center length of conveyor in ft

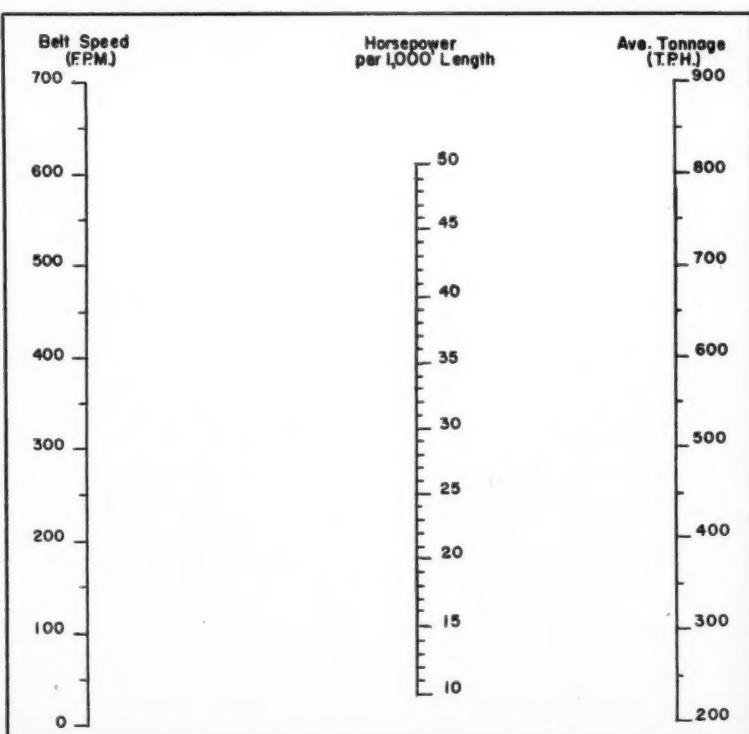
S = Belt speed in ft per min

T = Average loading in tons per hr

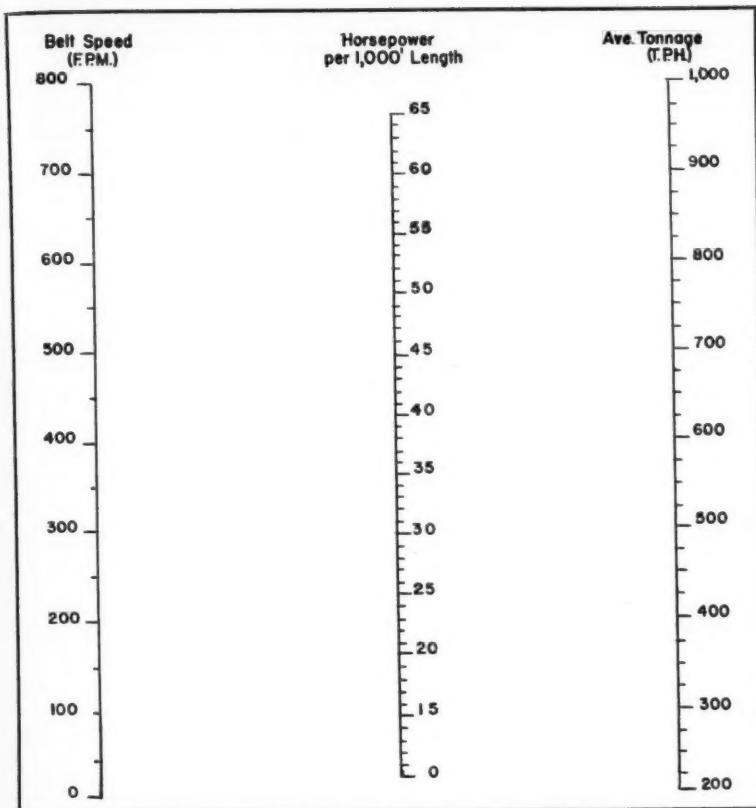
H = Height in ft load is raised or lowered. Positive if the load is raised and negative if the load is lowered.

t = Time in seconds to accelerate the belt from rest to full speed.

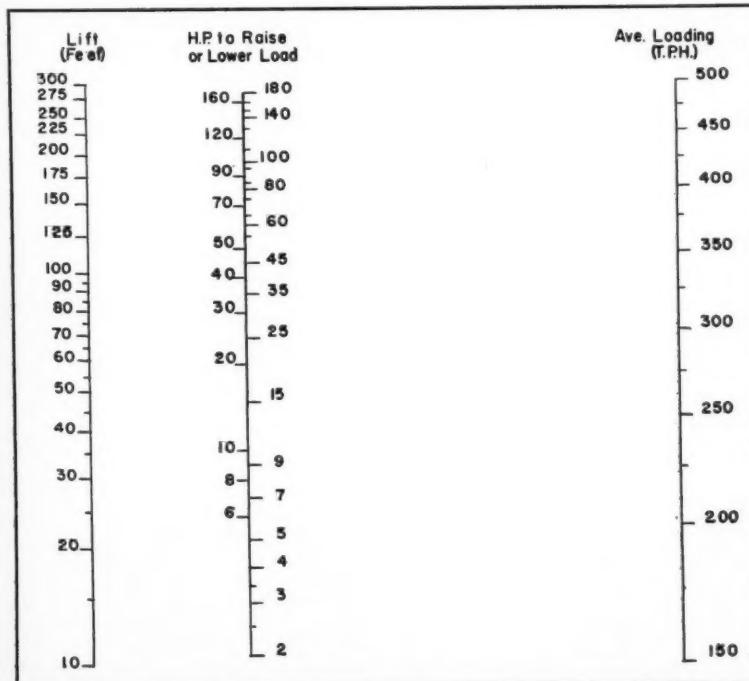
M = Average load in lbs per ft of conveyor. Additional consideration must be given the factor (M) when belt is heavily loaded for a portion of the shift and idle or light for a considerable time of the



Nomograph for determining driving horsepower per 1000 ft of 36-in. belt conveyor



Nomograph for determining driving horsepower per 1000 ft of 42-in. belt conveyor



Nomograph for determining needed horsepower to raise or lower load on a slope conveyor

shift. (M) should then be based on loading rate during the heavily loaded period. Total possible weight of the load on the belt at any one time must always be considered to assure that the motor has sufficient horsepower to start the belt under most adverse conditions. Table I shows theoretical carrying capacities.

The total horsepower required in the belt to drive any underground belt conveyor is the sum of four formulas which are:

(I) Friction Horsepower for Empty Belt

The horsepower required to move the empty belt is

$$hp = \frac{fBLS}{33,000}$$

(II) Friction Horsepower for Load

The horsepower required to move the load on this belt horizontally is

$$hp = \frac{fMLS}{33,000}$$

(III) Gravity Horsepower

The horsepower of gravity acting on the load, which must be overcome by the motor in an inclined conveyor, but which contributes to driving a declined conveyor is

$$hp = \frac{MHS}{33,000}$$

(IV) Acceleration Horsepower

This can be calculated by formula but it is rarely added as the motor is usually capable of delivering a 50 percent overload during a normal accelerating period. The "breaking" force in starting a fully loaded belt is generally considered about 135 percent of the full load torque.

Motor Horsepower

The sum of the values calculated by I, II, III and IV is the total horsepower required at the drive pulley. These results are used in computing the belt tension requirements. Transmission losses between motor and drive pulley must be added to obtain the horsepower requirements of the motor for the belt drive shaft.

For a horizontal conveyor, power is required only to overcome belt and load friction and the motor horsepower would be

$$\frac{I + II}{0.85}$$

For an inclined conveyor, gravity horsepower must be added and the motor shaft would require

$$\frac{I + II + III}{0.85}$$

Consideration must be given to the electrical equipment, when a conveyor is started too many times during the

shift. While the conveyor motor is capable of a 50 per cent overload for a brief period, an abnormal number of accelerations will tend to heat the motor beyond its normal rating.

Graph Method

The nomographs included in the article are based on motor shaft horsepower requirements. They are sufficiently accurate for field computations and will give the value of horsepower, or speed, or tonnage, when two of the three requirements are known. A straight edge is placed at the known values in the two known columns and the unknown is read directly from the third column.

These nomographs are based on 1000-ft center-to-center conveyor lengths. To obtain the motor size for a given length conveyor, the horsepower indicated on the nomograph should be multiplied by:

Conveyor length

1000

The nomograph for belt width is added for general information, but is limited in value, as it does not consider unusually large lumps or shape of lumps that must be taken into account when determining belt width. Judgment and experience must temper nomograph values of belt width, which are based on 50 lb per cu ft of broken material to be transported. It is suggested that Table I shown above be used.

Based on NEMA FORMULA $C = 0.032U (W-5)^2$
Where: C = tph per 100 fpm Belt Speed
 U = Wt. per cu ft of material
 W = Width of belt in inches

Width of Belt	TPH per 100 FPM OF BELT SPEED			CARRYING CAPACITIES IN POUNDS PER FOOT OF BELT		
	Coal (50#)	Salts (75#)	Metal Ore (100#)	Coal	Salts	Metal Ore
24 in.	60	90	120	20	27	40
26 in.	70	105	140	23	33	46
30 in.	100	150	200	33	47	66
36 in.	150	225	300	50	72	100
42 in.	225	335	450	75	100	150
48 in.	300	450	600	100	140	200

Table I. Tonnage Capacities of Various Belt Widths Running at Different Speeds

Belt Width	Idlers on 3 1/2-ft Centers				Idlers on 4-ft Centers				Idlers on 5-ft Centers			
	2 1/2	3 1/2	4	5	2 1/2	3 1/2	4	5	2 1/2	3 1/2	4	5
24 in.	17#	18#	20#	21#	17#	19#	19#	23#	16#	17#	18#	22#
26 in.	20	22	23	24	19	21	22	24	18	19	20	23
30 in.	23	24	25	26	22	23	23	25	20	22	22	24
36 in.	27	28	29	29	26	27	28	28	24	26	26	27
42 in.	34	37	... 32	35	... 32	35	... 32	35	...	...	...	...
48 in.	46	... 42	44	...	42	44	...	...	...	...	...	...

Table II. Approximate Weight of Belt and Moving Parts of Rollers Shown in Lbs per Lin Ft of Conveyor

The nomographs are based on the following formulas.

The three showing the determination of horsepower needed at the motor shaft per 1000 ft of conveyor length are derived from the N.E.M.A. formula:

$$hp = 0.085 w - 3.92 T$$

$$S \quad 1000 \quad 100$$

Where:
 w = belt width in in.
 T = average belt loading (tph)
 S = belt speed (fpm)
 L = conveyor length (1000 ft for these charts)

Each of the first three nomographs vary only in the width of each belt considered.

The chart used to determine horsepower needed to raise or lower a load on slope conveyors is based on N.E.M.A. formula:

$$hp = \frac{TH}{840}$$

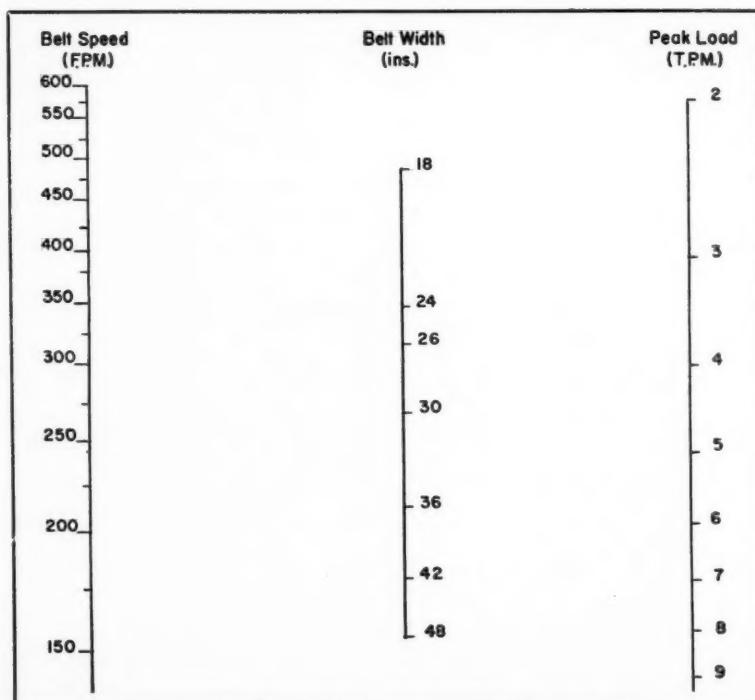
Where:
 H = distance load is raised or lowered (ft)
 T = average belt loading (tph)
The nomograph for determining belt width is based on N.E.M.A. formula:

$$W = 13.6 \sqrt{10,000 P + 5}$$

$$SU$$

Where:
 W = belt width (in.)
 S = belt speed (fpm)
 U = weight of material carried (This chart based on coal weighing 50 lb per cu ft, broken)
 P = peak load (tph)

Editor's Note: This article is extracted from a treatise that gives comprehensive and detailed specifications on belt conveyors and conveyor belting for mining service. Copies of the complete draft, which includes a discussion of the computation and application of conveyor belting, may be secured by request to the author.)



Nomograph for use in determining belt conveyor width

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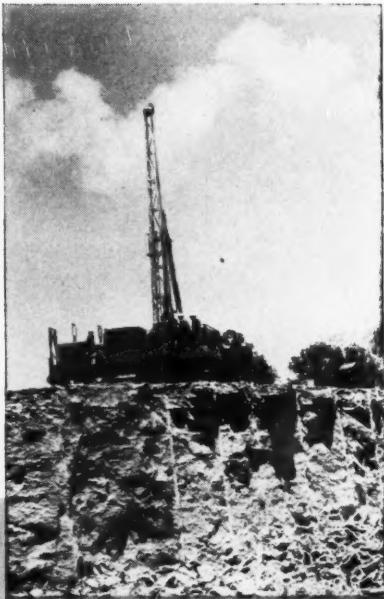
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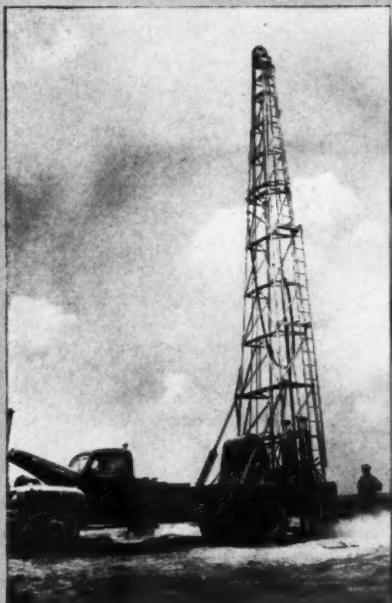
OPEN-PIT



MIDDLEWEIGHT CHAMPION Self-propelled, rotary blast hole drill. $6\frac{1}{4}$ " holes to 50'. For all formations where rotary drilling is practical.



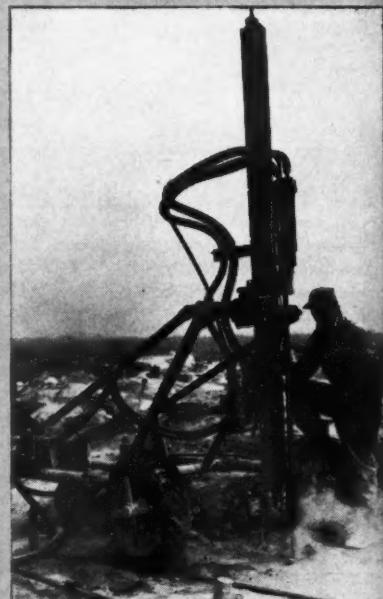
HEAVYWEIGHT CHAMPION Self-propelled, rotary blast hole drill. Drills $7\frac{3}{4}$ " hole to 200' in any formation where rotary cone-type bits are applicable.



MODEL 225 Truck-mounted rotary which produces holes to $6\frac{1}{4}$ ", 150' deep. Similar but smaller model is #75 which drills a $4\frac{1}{4}$ " hole 50' deep.



CHALLENGER A self-propelled hammer drill that produces a $4\frac{1}{2}$ " hole to 50'. Very maneuverable.



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SELECT-O-DRILL TABLE

Average Depth of Hole	Max. Diameter of Hole	Application	Model Class or Type
15'	2½"	Percussion drill for hard or soft rock—where one-man operation is desirable.	Lightweight Wagon Drill
24'	3"	Percussion drill for all formations where drilling angles vary from vertical to above horizontal.	Mediumweight Wagon Drill
50'	4½"	Percussion drill for blast holes in all formations—fast moving, fast setup.	T-500 Challenger
50'	4¾"	Truck-mounted rotaries for fast moving between holes. For blast hole drilling with drag or rotary cone-type bits in all except hard formations.	No. 75 Drill Rig
150'	6¼"		No. 225 Drill Rig
50'	6½"	Self-propelled rotary blast hole drills for all formations where rotary cone-type bits are applicable.	Middleweight Champion
200'	7¾"		Heavyweight Champion



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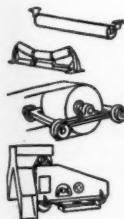
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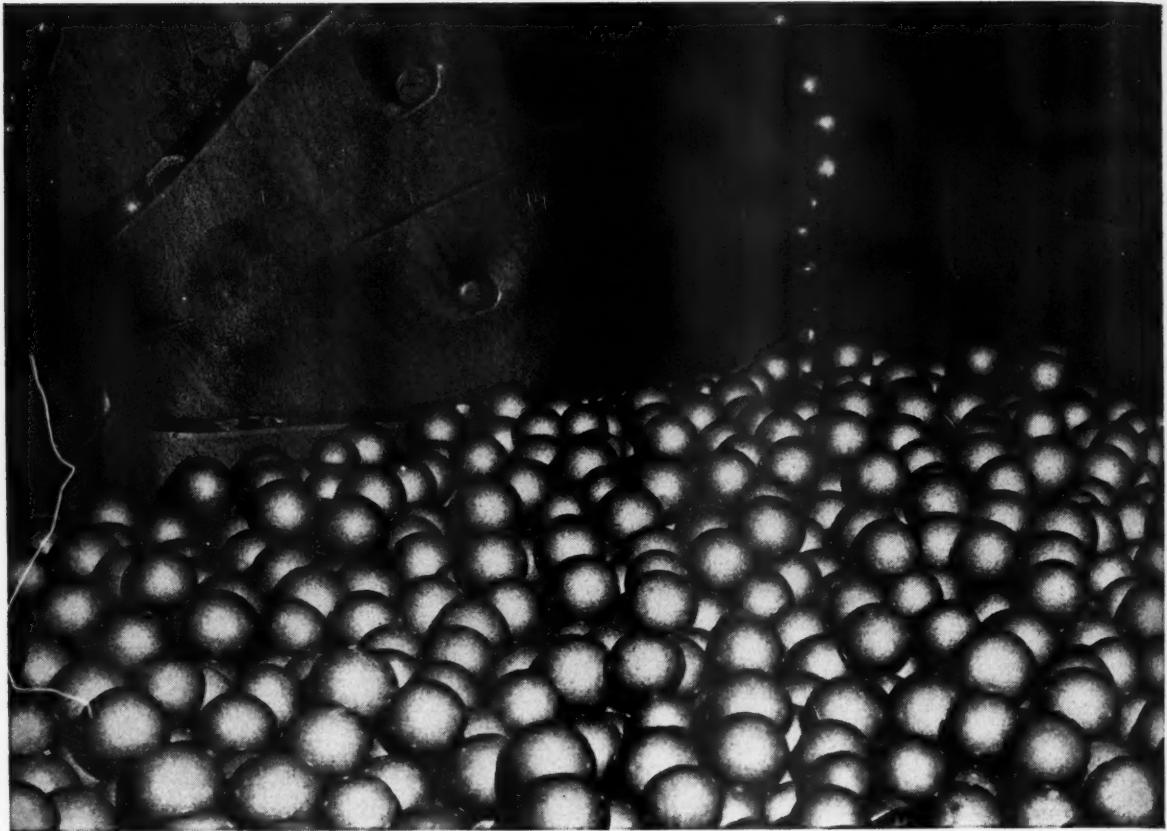
Link-Belt 60-in. wide belt conveyor served by eight L-B 48-in. wide belt feeders, in reclaim tunnel under coal dock.

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The good foreman knows his men and what makes each one "tick"

Selling Safety to the Individual

Intelligent, Continuous, Vigorous Leadership and Salesmanship Are Required to Hold the Employee's Interest in Working Safely

By A. H. ZEILINGER

Superintendent of Safety
Minnequa Works
Colorado Fuel & Iron Corp.

OBTAINING the employees' interest is imperative in selling safety to him. Good salesmanship depends upon enthusiasm, without which, no very great accomplishment is possible. Effective salesmanship also depends upon using as an appeal, the dominant motivating characteristic in the prospect's make-up. Some of these motivating characteristics are, self-preservation, pride, personal or material gain, rivalry, leadership, loyalty, responsibility, cold logic and others.

Rare indeed is the individual or group with none of these motivating characteristics. Usually one of these will stand out as dominant. Now the foreman, who is the salesman with the employee as his prospect, must discover the predominant motivating characteristic of the employee or the group of employees under his supervision, and appeal to that characteristic. Each employee may have a different predominant motivating characteristic. The good foreman, by ob-

servation, common sense and good judgment, will discover which is predominant. He will learn what each individual likes, what he dislikes; what he feels, what bounces off; what his interest, aims and hobbies are. Knowing these, he can determine which appeal to use to sell the employee and to get the best out of him. It should never be forgotten that the employee, as any one else, must be sold from his point of view, not necessarily from the seller's point of view. The good foreman prides himself in knowing his men and knowing how to get the best results out of them. Yes, he can know his men by proper contact and he can sell them by proper appeal.

Must Have Will To Do

Of course, on top of it all must be the will to do. I'd like to emphasize the importance of will by using this true incident. Some years ago an American lad won the 800 meter race at the Olympic games. That feat was flashed around the world. It was grand, indeed, but behind that feat was something finer. As a boy, that lad lay on his sick bed with badly burned legs. The doctor said he'd live but never walk again. The boy said I'll not only walk, I'll run. He did, all because of his will.

It was stated above that obtaining

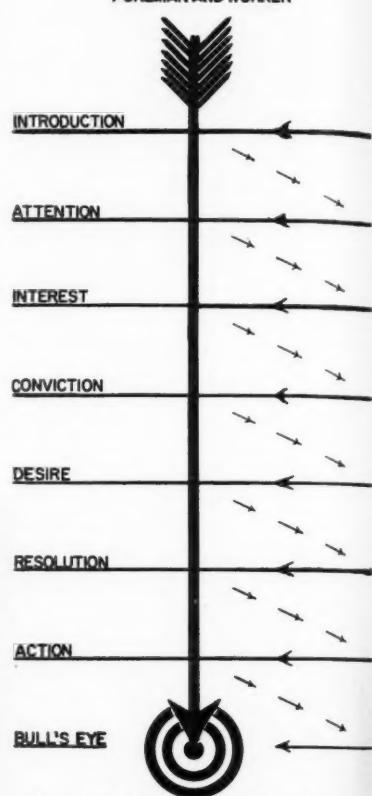
the employee's interest in safety is a selling job. At this point let's examine salesmanship in more detail. The accompanying arrow shows the mental steps that lead up to a successful sales job.

On the arrow are indicated, as the various mental steps, Introduction, Attention, Interest, Conviction, Desire, Resolve and the Act of signing on the dotted line, in the case of a commodity sale. The dotted lines leading away from the arrow shaft represent the employee's mind drifting off on tangents. The straight lines leading to the arrow shaft represent the foreman's power as a salesman to bring the employee's mind back when it wanders away. The arrow itself, of course, is the direct road to the bull's eye or signing on the dotted line—sales accomplishment.

Now take a look at the arrow at the "Introduction." Even that early

in the selling process the employee's mind may wander away. Possibly the approach has not been to his liking, possibly his predominant motivating characteristic hasn't been touched and he may be wondering why all this activity, why pick him out. The foreman's power as salesman gets the employee's mind back to the arrow at the point marked "Attention." Soon the employee's mind wanders away again. He thinks of going fishing, of something at home or a similar interest. Again the foreman's salesmanship gets the employee's mind back on the arrow and he has his attention. This is absolutely necessary before the next step, his interest, can be secured. Well anyhow, when he has the employee's interest, the foreman is that far along in the selling job. He now has the individual's interest or the group's interest whichever may be the case.

SALESMANSHIP FOREMAN AND WORKER



From Introduction to the Bull's Eye the foreman's job is a selling job

Selling Summed Up

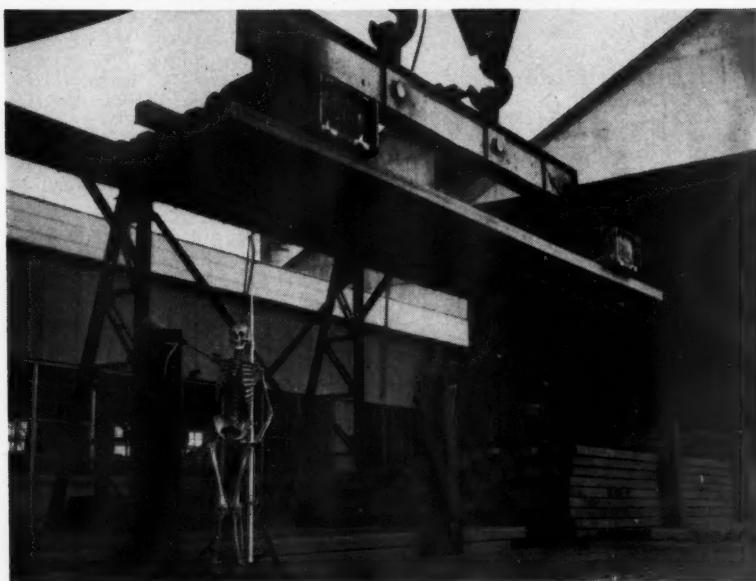
At this time we shall not pursue all the steps in making a sale as shown on the arrow, but let's sum up some points in selling. The good foreman, being a good salesman, when selling the employee, will not do more than his share of talking. He'll let the employee talk and he, the foreman, will be a good listener at this point. Nor will he interrupt the employee to refute his excuses. He may repeat them briefly to let the employee know he fully understands. After the employee gets his worries off his chest, he'll be ready to listen. Now is the time for the foreman to do his talking.

The foreman must avoid getting into a belligerent or argumentative mood. He asks questions to get the employee to state all his objections. With these off his chest, the employee is ready to listen.

Then, after these preliminaries are over, the foreman can base his final attack on one key appeal, the employee's predominant motivating characteristic, and avoid any other objections. This carries the developing scheme toward the bull's eye—another step in really selling the employee a real interest in safety.



Some employees respond to personal recognition

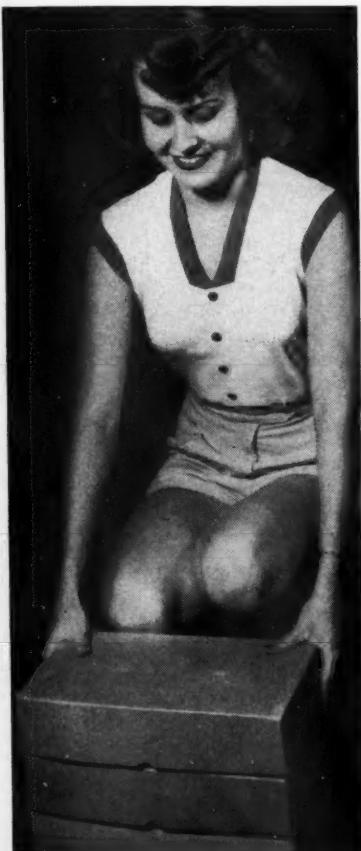


There are those who never become interested in safety

Use Strongest Appeal

Now let's take a specific case or two in which the foreman will seek the employee's interest in safety. Some individuals may have several or even all of the motivating characteristics mentioned above but usually one stands out stronger than the others. It is predominant. The observing foreman will note that one and use it in selling the individual an interest in safety, or anything else.

One individual may have a strong tendency to "follow the leader" and care little about his own personal safety. It would be a waste of time to try to get him interested in safety by using the "self preservation" appeal, although that is usually a strong one. He could be sold an interest in safety by pointing out that the leader he adores is a good safety man, one who really gives a lot of attention to safety. Another man may not care much about what the other fellow does but has a strong sense of responsibility because of his wife and children. Obviously, the foreman would use the "personal responsibility" appeal in getting the interest of that fellow.



Teaching employees how to lift is easy once their attention has been gained



The spirit of competition is often a powerful motive

The good foreman will always use the predominant motivating characteristic of each employee to capture his interest in safety. The good foreman will know what really motivates each worker through continual use of his powers of observation, his common sense and his good judgment. He must never let these tools get rusty, in finding out what appeal is predominant in the case of each individual.

Even then, there will be some employees who do not seem to respond properly. A mill foreman was having difficulty getting one of his workers to wear goggles. He learned that one of that worker's hobbies was trap shooting. One day the foreman approached the adamant worker and handed him a glass eye to examine. The worker was asked to tell the foreman what he could see through the glass eye. After trying, the worker exclaimed: "Nothing."

The foreman said: "It will cost only \$10 and we can patch the color of your eyes. Shall we order you one?"

"Order me one?" asked the worker. "Why, yes," was the foreman's rejoinder. "You cheat on wearing your goggles and you're going to need one."

The wind went out of the worker's sails. He hung his head and made no reply but from then on he wore his goggles.

There are many other schemes that might be used to sell an interest in safety in special cases, but these few requisites are common to all cases:

(1) The foreman must believe accidents can be prevented.

(2) He must have an honest desire to prevent them.

(3) He must be an example.

(4) He must have limitless energy in his sales efforts and perseverance. It's a never-ending job.

Interest in safety can't be rammed down men's throats; but, by intelligent, continuous and vigorous leader-

ship and salesmanship much can be done in obtaining the employee's interest in safety.

No foreman will be 100 percent perfect in selling safety. As in other efforts, no one is. So the fellow who can't be sold or won't be sold will have to be removed. This is regrettable but industry can't permit one bad apple to spoil all the others in the barrel. The foreman will be fair yet he must be firm, too. Safety must prevail, but with common sense, of course.

One thing more, his job will be easier, more effective and more pleasant if the foreman considers himself a big brother to his men and if he will be considerate and really interested in their welfare. To emphasize that thought, this little poem contains a lot of food for thought:

Let me be a little kinder,
To my brother who is blinder;
To the faults of those about me,
Let me praise a little more.

Let me be when I am weary,
Just a wee bit more cheery;
Let me serve a little better,
Those that I am striving for.

Let me be a little braver,
When temptation bids me waver;
Let me try a little harder
To be all that I should be.

Let me be a little meeker,
With my brother who is weaker.
Let me think more of my fellow
worker
And a little less of me.





Continuous mining is a chain of correlated operations

Maintenance of Continuous Mining Machines

A Preliminary Report of the Committee on Mechanical Loading, Designed to Show Where Operating Delays Occur in a Continuous Panel and to Determine How These Delay Costs Can Be Reduced

LATE in 1953, the Mechanical Loading Committee of the American Mining Congress Coal Division began a study on continuous mining machine maintenance, covering the cost of labor and material required to maintain the equipment in operation. The study is not concerned with unit machine tonnage, the man-tonnage nor the over-all operating cost; the objective is to determine where possible savings can be made in the maintenance costs for continuous mining machines. The scope of the report was set by the committee as follows:

1. To develop factual data on cost of machine maintenance in labor and material
2. To compare such data with the same information for parallel operation with conventional equipment under the same physical conditions and the same supervision and labor
3. To improve methods of training the operating and maintenance personnel in the handling, care and repair of continuous mining equipment
4. To assist a coal company in setting up a practical maintenance

By W. J. SHIELDS

M. H. FORRESTER

E. H. JOHNSON

RUSSELL VANCE

Subcommittee Members

program with scheduled supervision

5. To accomplish, where possible, better design, workmanship and materials in continuous mining equipment and particularly to correct weaknesses developed in actual operation

6. To promote, where possible, some degree of standardization of motors, pumps, controls, hydraulic hose, fittings and other parts and to consider the accessibility of rapidly wearing parts for replacement

7. To establish a method for making time studies of machine delays and contributing operating delays in the continuous mining panel

The last is essential in order to summarize the importance of time

losses that occur from all causes and to determine the relative importance of machine delays in total available working time.

The committee prepared two delay report forms for a continuous mining operation; "Machine Delays on Continuous Miner," and "Delays on the Section." Total delay time on the machine is reported under the headings: lubrication, head and rear end, chassis, traction, cutter bits, hydraulic and electrical. Delays on the section include time losses due to continuous machine breakdowns, service and main haulage, power, roof, ventilation, supplies, auxiliary equipment and water supply.

A number of companies were contacted in a field survey made by committee members to acquaint the mine managements with the scope and purpose of the study and to obtain their personal cooperation in securing the data. As a result of this survey, the subcommittee early this year had received reports from ten coal companies, submitting accounts on 33 continuous mining operations. Included in this data were the various causes of delays which had occurred in the

continuous mining sections such as machine breakdowns, haulage, roof support, etc. A compilation of these time losses, expressed in percentage of the working shift, is given in the accompanying tabulation. This is presented merely as a progress report and to indicate a possible line of approach to the question of how to increase continuous mining efficiency. Supplementing this data, are brief descriptions of the seams, roof and operating conditions of the mines reporting.

Summary

While the data which has been collected so far is not conclusive, nevertheless it has developed some points that are worth consideration. The machine delays, which may be due to breakdowns or on-shift repairs, average only about one-third of the total time lost in the continuous mining sections reported upon. This bears out a fact known from the time of the first

continuous machine installation—that "continuous" operation depends as much on the performance of the auxiliary operations as on the machine itself.

In the tabulation, the "total delays" in the last column gives a 68 percent operating time efficiency for all conditions; a 76.4 percent time efficiency where roof delays are under 10 percent and a 62 percent efficiency where roof delays are over 15 percent. The committee believes that this is an excellent showing for continuous mining, representing as it does, about twice the operating time efficiency of conventional mechanical loaders under similar conditions.

One interesting statement made in the course of the study is that the total maintenance cost of continuous mining equipment is almost directly proportionated to the bit cost. That is, where the seam conditions cause a high bit cost, the load is reflected on the general maintenance of all ma-

chine parts. Where bit cost is low, breakdowns are infrequent and rebuilding is at longer intervals of time.

A machine breakdown is dependent on a number of factors; (a) faults in design, workmanship or quality of materials in the manufactured unit; (b) ignorance, negligence, and lack of interest on the part of the machine operator; (c) physical conditions such as characteristics of the coal, partings and intrusions in the seam and (d) operating the machine under conditions and in service for which it is not designed. Since one or all of the foregoing factors may be present in a mining operation, unless the true condition is known any conclusion or data that is based on a maintenance cost is apt to be misleading. For this reason, the committee in continuing their study will endeavor to analyze as far as possible the basic reasons for the various classes of operating delays that occur in a continuous panel in order to see where the real remedy lies.

CAUSES OF CONTINUOUS MINING DELAYS EXPRESSED IN PERCENTAGE OF TOTAL SHIFT

Mine	Continuous Machine	Haulage	Roof Support	Supply Handling	Other Delays	Total Delays
A-1	9.58%	5.14%	1.65%	3.37%	3.71%	23.46%
A-2	9.67	4.75	1.00	3.34	4.07	22.83
A-3	10.71	5.43	1.22	3.29	3.98	24.63
B-1	10.6	3.5	19.8	1.8	1.6	37.3
B-2	12.9	2.0	15.3	1.8	2.6	34.6
B-3	9.5	1.3	21.7	1.9	2.7	37.1
B-4	9.4	5.2	21.7	2.7	3.7	42.7
C (Av. 5)	4.2	0.8	16.9	2.1	6.0	30.0
F (Av. 10)	10.49	5.03	4.2	...	2.70	22.42
G (Av. 5)	18.0	6.0	...	...	1.0	25.0
J-1	6.5	5.4	18.1	0.8	7.5	38.3
J-2	10.0	4.0	28.3	0.4	3.3	46.0
Average Delays	10.13%	4.04%	12.49%	1.80%	3.57%	32.03% Average Machine Operating time 67.97%

MINE A operates three machines in the Freeport Seam which has a height of 44 in. Normally, the roof is good and requires only posting; however, some tender roof areas are encountered which require bolting or cross bars. In these bad areas the working time of the continuous machine decreases in proportion to the time required to take care of the roof. The continuous machine dumps the coal onto the mine floor and a pick-up mechanical loader puts it into shuttle cars which transport to a 30-in. belt conveyor.

MINE B operates continuous mining in the Pittsburgh No. 8 Seam, which has an over-all height of seven ft, consisting of six ft of coal and one ft of hard draw slate. Four continuous machines are operated; three have six-chain heads, while one has a rotary head. The block system is used with entries and cross cuts on 100-ft centers. Resultant pillars are extracted to as full a recovery as possible. Each continuous machine has auxiliary equipment consisting of two shuttle cars, one portable rock duster and one car spotter. One swing motor crew services two continuous mining units.

MINE C gives an average of five operations in the Upper Freeport Seam which has an average mining height of 6½ ft. There is a 12-in. bone bottom band, high in ash. The floor is fire clay and the roof is a shale which varies from zero to 20 ft thick. Most of the continuous mining is in pillar extraction, recovering chain pillars and small barriers. The roof problem directly affects production as it is difficult to get areas wide enough to effectively break the secondary sandstone.

It is necessary to mine the pillars in small lifts, causing considerable equipment moving. The continuous machine loads onto a shuttle car which transports to five-ton cars. There are five units in use; the first went into operation in June 1950, the fifth in June 1952.

MINE F is in the Lower Kittanning Seam, which has an average height of 42 in. of soft friable coal. There are no partings except approximately nine in. of bone immediately over the coal; mining is done under this bone when possible. The floor consists of approximately four in. of hard fire clay. There are ten continuous machines operating the room and pillar and the block system. Each machine loads into a surge car and a shuttle hauls from there directly to a 30-in. conveyor belt. The data covers a period of 15 days in September 1953.

MINE G operates five continuous machines working three shifts per day. Figures submitted show a typical machine performance for an average month. It will be noted that the report does not include any time lost for roof support indicating that the top conditions are good and have caused no interruptions.

MINE J covers two continuous operations—an a-c and a d-c machine working in two different sections of the same property. Roof bolting is used in both sections, but the time losses indicate that the top apparently was a little more favorable in J-1 than in J-2. The data covers a total of approximately 160 working shifts during September-December 1953.

Operators Corner

Winter Conditioning For Crawler Tractors

By FRED J. SHRECK

Industrial Power Division
International Harvester Company

OLD Man Winter pulls no punches and plays no favorites. He packs an icy fist and blows a cold, cold blast. There is one thing you can bank on for sure:

Winter downtime will cost you money unless you winter-condition your crawler tractors right now.

Cold weather repairs are difficult to make in the field.

The strain of low temperature starting and the use of incorrect grades of oil often turns small defects into breakdowns.

So don't even try just "getting by" this winter. Start your preventive maintenance program for crawlers at the first opportunity before the cold sets in.

Inspect for Oil Leaks

The very first thing to do is check for oil leaks. Look for collections of new, oily dirt in odd places. And in the case of a dirty engine, look for places where leaking has streaked the dirt. Make the same careful visual inspection of the engine transmission and final drive housings, the sprocket gear and track rollers.

The next step is to clean the tractor and engine—for four basic reasons:

- (1) Aids proper cooling of engine.
- (2) Oil leaks show up faster.
- (3) Decreases fire hazard.
- (4) Gives operator more pride in his tractor.

Proper engine cooling is especially important in cold weather operation because the lighter winter oils run hotter than heavier oils. The oil film protecting moving parts gets thinner as oil temperature rises. Therefore, any crankcase dirt pack left on impedes proper cooling of light oils reducing their lubricating effectiveness.

Cleaning can be done with high pressure hose of steam. However, a two-in. low-pressure stream of water is preferable. Wipe off the bad spots with diesel oil or kerosene. Using low-pressure water eliminates the possibility of damage to any gaskets or seal points.

Lubrication System

In going over the lubrication system for winter, begin at the crank-

case. Engine oils get heavy with use because the light ends of the oil burn off in combustion leaving the heavier base oil.

Drain old oil from a thoroughly warmed-up engine, preferably after a day's run. Then flush crankcase with regular crankcase flushing oil—not diesel fuel or kerosene. (Sometimes when kerosene or diesel is used, enough is trapped inside to cause foaming of the new oil when crankcase is refilled.)

Run the engine at half-throttle with the flushing oil for half an hour.

Drain oil filter, wipe inside with clean rags and replace old filter elements with new.

Now refill crankcase with grade of oil recommended by manufacturer for temperature at which tractor is to be operated. Change oil in fuel injection pump but do not flush.

Transmission, final drive and sprocket drive are next on the list. Lubricants in these units also become heavier with use. In fact, if high viscosity

lubricants are left in too long, they will lose good lubricating characteristics and tend to "channel" around the moving parts so that the parts run dry. As these units heat up in use, dirty oil on outside of housing is sucked inside through any seal leaks or the ventilator.

Metal-wear particles also become mixed in the lubricant. If there is any doubt about the existence of these small pieces of metal, magnetize a rat-tail file and stick it in the housing. It will come out covered with metal particles that can cause serious wear.

For these reasons, drain the lubricant without fail even though the units appear full. Then put in flushing oil, not kerosene or diesel fuel, and run tractor 15 min, not under load. Drain or refill in accordance with manufacturer's recommendation.

Next, refill the lubricating gun with the proper lubricant and force old lubricant out of track rollers with new. Follow this with a complete chassis lubrication. Wipe off excess



The crankcase breather should get special attention for pre-winter conditioning

lubricant. It gathers dirt and is sometimes drawn back into lubricated point by heat. This causes rapid wear.

Electrical System

Clean battery terminals with solution of warm water and baking soda using a wire brush. Dab grease or special paste on terminals and tighten them.

Also check specific gravity of cells with hydrometer. Water level should be brought up with distilled water. Continual low water in battery is an indication of an overcharge condition which calls for corrective action by authorized repair personnel.

Look for worn-out brushes on the commutator and generator armature. Here again, repairs should be made only by distributor's mechanics.

Voltage regulator, starter and gen-

the combustion system. Start by cleaning plugs and properly spacing the gap. Check all spark plug wires and connections.

Adjust or replace magneto or distributor points as needed. Clean magneto impulse coupling with kerosene and lubricate with a light oil. SAE No. 10 is satisfactory in most cases.

Don't overlook the air cleaner. It should be removed and disassembled. Wash out with diesel fuel or kerosene. Reassemble and fill with recommended grade of oil, usually the same as used in crankcase.

Be sure to check all air cleaner connections to inlet manifold. See if leaks are indicated and make repairs where necessary.

Diesel fuel filters and water traps shouldn't be passed over. Take them apart and wipe out with clean rags.

Drain and refill with the anti-freeze called for by manufacturer.

Also check the fan belt and fan belt drive pulley for looseness and adjustment called for by the manufacturer.

A good way to clean the outside of the radiator is to splash water from a one-lb coffee can through the fins with the engine at high idle. The fan will draw water through radiator and suck out a lot of debris that can't be seen but is lodged between the fins. *Caution:* There is danger of breaking the fan blades using this method if more water than a one-lb coffee can full is used at a time.

Engine Ventilating System

To insure proper combustion and lubrication, clean the complete engine ventilation system including crankcase breather on side of engine, breather pipe and elbows on top of valve cover. This step is important because these pipes take out condensation which often causes corrosion and failure of valve springs and rocker arms. This is one precaution that should be underlined. Furthermore, it is recommended that engine ventilating systems be checked frequently during the cold weather operation.

Cold Weather Starting Tips

For tractors working and parked for extended periods in cold, it's a good idea to equip them with hood sides.

Avoid parking tractor in exposed place for a long period without running. If it is necessary to keep the tractor out in winter, run it at least once every day.

In temperatures of 10° F or below, dilute oil in air cleaner and crankcase with kerosene in accordance with manufacturer's specifications.

Fill fuel tank at end of work day to prevent collection of moisture.

Storing Over Winter

Store in dry and protected place. Thoroughly wash and clean tractor. Completely lubricate tractor. Drain diesel fuel tank, water trap and fuel filters; open air vents to secure complete drainage. Then close vents. Work flushing oil through the fuel injection system as recommended by manufacturer.

Drain all water from cooling system.

Drain all gasoline from gas tank, strainer bowl and carburetor.

Attach oil can to an air gun and, using a light oil with rust inhibitor, spray inside spark plug holes, inside the valve cover and all surfaces above oil level. Then spray inside gas and fuel oil tanks.

With these simple precautions, whether you work or store your crawler this winter, it will last longer and stay on the job without failing when Old Man Winter comes around.



Lubricants act differently in the winter than in the summer

erator should be checked, tested and adjusted. This can be done effectively only by a qualified mechanic using proper testing equipment. This equipment is portable however, and can be taken to the job-site by most distributors.

In case of a bad connection or corrosion, voltage regulator would not work properly causing high voltage and low batteries. Indications of this are continual low water in battery and premature wear of commutator and brushes.

Next, visually check brushes and bushings of starter and commutator.

Combustion System

For fast starts and peak efficiency during winter, there's nothing more important than proper adjustment of

Otherwise, the water and debris will cause a starved condition and reduce engine power as fuel gets heavier with cold.

Cooling System

First of all, check for leaks in the head gasket. To do this, remove radiator cap and fill level with cap. Start engine and run long enough to open thermostats. Accelerate suddenly. If bubbles appear, it is a good indication that cylinder head gaskets leak.

Also check for leaks in hose and hose connection and water pump packing. Check radiator for leaks by careful visual inspection.

Flush radiator with flushing compound or a solution of baking soda. Leave off radiator cap and run until hot. Drain and flush with clean water.



Unusual problems faced designers of terminal at St. Louis, Mo.

River Facilities for Handling Coal and Coke

AN aggressive venture in modern river facilities for handling and transporting coal and coke is evident in the recently completed river terminal at St. Louis, Mo., for the Great Lakes Carbon Corp., New York.

To supply their by-product coke ovens with suitable coal from the Appalachian Field and to handle coke from those same ovens, both by water, a river terminal was built by Great Lakes Carbon Corp. at the coke oven plant located on the Mississippi River south of St. Louis.

The coke plant is close enough to the coal unloading station to allow handling the coal with rubber-tired equipment from the unloading station. The problem of unloading, storing, reclaiming and supplying the plant with coal and loading coke on the river was studied and coordinated to obtain the best, most efficient methods and use of the space available.

The Mississippi, at this location, is relatively narrow with high steep banks on the plant side of the river and low bottom land on the other.

Preliminary surveys based on existing gauges several miles distant were not accurate when an attempt was made to correlate current gauge readings with U. S. Geological Survey datum. The reason for this discrepancy was found to be the contrast in width and nature of banks at the site

By DAVIS READ

Consulting Engineer
Chicago, Ill.

of the gauge and plant. The river channel is much narrower at the gauge site and the high banks caused the water level to rise higher at the gauge than at the plant. This difference was approximately three ft at highwater. By using the gauge reading at highwater and converting it to U.S.G.S. base the highwater would have covered the active oven plant and yard which actually was approximately three ft above highwater.

Upon investigation of strata below the river bottom it was found that, contrary to the usual condition in the area, hard strata would be encountered at shallow elevations. It would, therefore, be impossible to drive wood piling for foundation and dock purposes. Consideration was then given to sinking caissons to the hard strata which would be bedded in concrete and then filled with sand and gravel. It was finally decided to drive cells of steel sheet piling into the strata a sufficient distance to resist side pressure and fill them with sand and gravel. This method proved to be both strong and economical.

One large cell, 46 ft in diam., was

constructed for the foundation of the unloader. This cell also serves as one support for the coke boom with a smaller, adjacent cell for the other boom support. Eight other cells, 20 ft in diam., were located up and down stream for barge movement.

Coal is unloaded by a traveling crane with clam shell bucket and discharged into a receiving hopper, then, by way of a belt conveyor, it goes to a loading hopper for loading into rubber-tired carryalls. Coal can either be stored in the yard or hauled direct to a surface hopper from which it is conveyed to the coke ovens.

Stored coal is reclaimed by the same equipment as needed.

Coke is hauled from the ovens in railroad cars to a surface hopper from which it is fed onto a belt conveyor and then to the barges with minimum degradation.

Barges are moved up and down stream by means of two-drum rope hoists. A breast line is mounted along cells with lashing to barges for guides.

To keep manpower to a minimum, barges are handled to and from the fleet by a harbor tug which is available. The fleet is moored down river.

A small rubber-tired bulldozer is lowered into each barge to clean up or pile the coal for quick loading by clamshell, during final stages of unloading.



Wheels of GOVERNMENT



As Viewed by HARRY L. MOFFETT of the American Mining Congress

WITH Congress away from Washington and its members busy campaigning, the administrative departments and agencies of the Government are settling down to their regular routines. Most Federal officials breathed a sigh of relief when the 83d Congress finally closed up shop, for during its stay their time was largely taken up in appearances before Committees and in answering inquiries of individual members.

The Administration, which has been under steady fire from critics since the first of the year over declining industrial production and an accompanying boost in unemployment, has come up with a report on the economic health of the country which declares that the these declines have been halted and better conditions are in sight.

The President pointed out that personal income and bank debits are up, that retail sales and construction are both on the rise, that expenditures for plant improvement continue high, and that unemployment is diminishing. He acclaimed the action of the 83d Congress in enacting an economic program which "will help to reduce unemployment and stimulate enterprise and development in all directions."

New Tax Law

The President also had a pat on the back for Congress for enacting a tax program during the past year providing for cuts totaling \$7.4 billion. He declared that the new revenue revision law, the first major overhaul of the tax laws in 78 years, will help millions of Americans by giving them fairer tax treatment and will provide a "shot in the arm" for our economy.

On the revenue front, the Administration scored another victory when Congress authorized a temporary boost in the national debt limit from \$275 to \$281 billion. The new law provides that the debt limit shall revert to \$275 billion by June 30, 1955. Adoption of the increase culminated a year's drive on the part of Federal fiscal officials to lift the debt ceiling.

Meanwhile, the passage of the new

tax revision measure brought about demands from taxpayers for interpretations of changes made in the laws. Internal Revenue Commissioner T. Coleman Andrews has called upon taxpayers to be patient, stating that the new code makes it necessary for the Internal Revenue Service to revise all of its existing tax regulations. He said that tentative rules relating to depreciation and corporate distributions and adjustments would probably be issued at an early date. He pointed out that in addition to these, some 56 other areas will have to be covered by separate Treasury decisions.

Tariff Quandary

At this writing there has been no decision by the President on the Tariff Commission's recommendations for a hike in the lead-zinc tariff rates. A Cabinet Committee composed of the Secretaries of State, Interior, Treasury and Commerce and the Director of the Office of Defense Mobilization has held several meetings to discuss the Tariff Commission's report and to attempt to reach some solution that would be acceptable to them and to the White House.

Press and other reports indicate that these meetings have not been all sweetness and light. These reports, believed to be fairly authentic, hold that Secretary of State Dulles has been adamant against the imposition of higher tariff rates, declaring that such action would be harmful to our relations with foreign nations. On the other hand, it is understood that the other Cabinet members have strongly urged the adoption of some tariff action to strengthen the domestic mining industry. ODM Director Flemming is reported to be maintaining a neutral position. Basically, the issue boils down to whether the "escape clause" provision of the Trade Agreements Act is to mean anything. The Cabinet impasse over lead-zinc tariff relief is one which will probably continue over other tariff pleas until the President decides what policy the Federal Government is to take, now and in the future.

Washington Highlights

NEW TAX LAW: Economy Booster

TARIFF: Policy in Question

COAL: Government Plans Aid

MINE FIRES: Control Legislation
Enacted

NLRB: Overturns Previous Rulings

MINERAL EXPLORATION: Funds Increased

Federal Coal Aid

In another segment of the economy, the Government made its first move to help out the domestic coal industry. The Foreign Operations Administration initiated a program under which it will purchase 10 million tons of anthracite and bituminous coal for shipment, under the economic aid program, to allied countries in Europe and Asia which are short of fuel. This program is to continue through June 30 of next year.

In announcing the Government's procurement plan, FOA Director Harold Stassen said that it is designed to bring some relief to the hard-pressed domestic coal industry. He made it clear that the 10-million ton program will supplement and not supplant coal now being purchased with free dollars and coal now being supplied by offshore sources.

Meanwhile, other Government committees are undertaking to find additional means of revitalizing the coal industry. President Eisenhower has named a Cabinet Committee to come up with recommendations for the use of coal and other fuels in the nation's defense mobilization activities. A special Coal Industry Commission, headed by ODM Director Arthur Flemming, has met with representatives of the coal industry to determine the problems it faces, and to study the recommendations made by the industry for

strengthening its economic position. William Hahman, formerly with the Defense Solid Fuels Administration and well-known coal authority, has been named staff director for this commission.

On Capitol Hill, the Minerals, Materials and Fuels Subcommittee of the Senate Interior Committee, headed by Senator George W. Malone of Nevada, has also initiated an investigation of the nation's fuel resources availability in the event of a national defense emergency.

Coal Mine Fires

In the closing days of the 83d Congress, a measure sponsored by Rep. Fenton (R. Pa.), was approved which authorizes the Secretary of the Interior to make surveys and investigations relating to the causes and extent of outcrop and underground fires in coal formations, and methods for controlling or extinguishing such fires.

The new law bans the use of Federal funds for the control or extinguishment of fires in any privately-owned operating mine. However, it gives the Secretary discretionary authority to undertake projects for the control or extinguishment of mine fires in inactive coal mines, not owned by the United States, providing agreements are obtained as to the "performance and maintenance of the work required to control or extinguish such fires" and the State or person controlling such lands contributes fifty percent of the cost involved.

New NLRB Rulings

Three important rulings have been handed down by the National Labor Relations Board recently, dealing with strike notices, employer questioning of employees concerning union affiliation, and joint lockouts.

The Board has held that provisions of the Taft-Hartley Act calling for a 60-day strike notice do not give labor unions the right to call strikes before the actual termination of a labor contract, unless that agreement contains a provision which authorizes a strike in advance of the termination date. This ruling reverses previous Board policy which had allowed unions to strike at any time provided 60-day notices were given. In handing down this decision, the Board made it clear that the ruling had no bearing on the right to strike for reasons and purposes other than to obtain contract modification or termination.

In another reversal of policy, the Board has ruled that employers do not violate the labor law when they merely ask their employees whether they are union members, and do so without conveying any implication of reprisal or benefit because of their union membership or non-membership.

In a third case, the Board has ruled that employers engaged in multi-em-

ployer bargaining may establish a joint lockout when a union calls a strike against one of the employers in the bargaining unit during contract negotiations.

Exploration Funds Increased

The Office of Defense Mobilization has provided the Defense Minerals Exploration Administration an additional \$6 million in borrowing authority to finance exploration programs for strategic and critical metals and minerals during the current fiscal year. To date some \$28 million have been authorized for this purpose.

Over the three-year existence of DMEA, the Government has advanced

about \$20 million in exploration loans. A total of 647 contracts have been entered into during this period for all types of metals and minerals needed for defense mobilization. In the past several months Government assistance for exploration has been extended for tungsten, lead and zinc, copper, uranium, and mica.

On another mineral front, the ODM has established a purchase program for domestic fluorspar for stockpiling. Purchases are to be made by the General Services Administration. No floor price has been announced. ODM is expected to shortly establish additional long range stockpiling programs for other critically needed metals and minerals.

Using Our Engineers

(Continued from page 29)

used in a supervisory capacity. There is nothing in the wording of the law in some states to give experience credit for graduation from an accredited mining school. A number of mining companies have helped to relieve the deficiency by well organized training programs that permit the effective use of graduates in industrial engineering or other capacities during a part of the indoctrination period. In general, it is surprising how quickly the majority of graduates are advanced into positions of responsibility, especially those entering straight engineering fields.

Conclusion

The question in regard to use of engineers effectively is well summed up by a graduate of the Class of 1951, whose comments may be abbreviated as follows:

"As an engineer, I admit that on the whole the mining industry has turned its back on its best and cheapest source of knowledge and information. The industry relies on the experience of its older miners and uses the vast knowledge of past methods instead of looking to the engineer for the modern up-to-date methods of production. Experience is necessary but modern engineering can lower the cost per ton and raise the standards of the industry if given a chance. In many instances, the engineer is limited to prospecting and a few select jobs, while the great opportunities the profession offers in the production end are passed by. The greatest improvement the industry can make is to accept the engineer and bring him into the management circle where his knowledge can be used to the fullest extent. The mining industry is sitting back hoping the men from the old school will come up with new ideas, while its ace-in-the-hole remains unplayed.

"Sitting in the seat of management, I can see why this condition exists.

In many cases, the engineer has brought on the situation in which he finds himself. The engineer is needed in management, but must carefully analyze himself to see why he is held at arm's length. He starts an assignment, gets interested in it, and finds himself delving into the subject with enthusiasm, while one important factor slips away from him. Will the answer obtained warrant the money spent in obtaining the solution? The engineer must be practical and cost-conscious before he will be accepted. Engineering must be kept simple and inexpensive before it will be approved by management. When an engineering job is completed, there are two questions in the minds of management: First, how much has this cost; and, second, how much will it make. When the engineer learns to overcome this important obstacle, he will find himself accepted in the inner circle and progress to the level where he belongs."

It is evident that some organizations in the mining industry are using engineers effectively. Some are not. The eager desire on the part of young engineers to be given a chance to exercise and develop their engineering training should be recognized. By adopting such a policy, the industry is bound to prosper.





Personals

W. E. Mullins, formerly vice-president, Midland Electric Coal Co., has been named chairman of the Board of Directors, and T. C. Mullins, Jr., has been promoted from vice-president to president of the company. In addition, Harry M. Ziv, vice-president of Walter Bledsoe & Co., is now a member of the Board of Directors.

Midland Electric Coal Co. has one mine at Atkinson and two at Middle Grove, Ill.

Stanley McDougall has been named to the new position of manager of mines for Bunker Hill & Sullivan Mining & Concentrating Co. in Kellogg, Idaho. He had been mine superintendent for that company since 1934.

Ray Graves has been appointed assistant to the general operating manager, New York, of Universal Atlas Cement Co., a subsidiary of United States Steel Corp.

R. C. Mahon, superintendent of the M. A. Hanna mines in Mineral Hills, Mich., has retired after 42 years of service. He will continue with the company in an advisory capacity. James Ivers, Jr., general engineer of the Iron River district, succeeds Mahon as superintendent of the Homer mine, and J. D. McAuliffe has been named superintendent at the Wau-seca mine.

Johnstown Coal & Coke Co. of Johnstown, Pa., has announced the retirement of two officials having a total of 85 years of service with the company. They are Mrs. Martha Custer Curry, assistant treasurer, and William D. Hughes, vice-president in charge of real estate.

J. H. Moses, chief geologist for Reynolds Metals Co., has announced that Wilson D. Mitchell has taken charge of the geological division's exploration program in the Guianas and will make his headquarters in Paramaribo, Surinam. Bruce A. Randall, another geologist with the company, has transferred to Salida, Colo.

Four changes in mine management have been announced by The New River Co. of Mount Hope, W. Va.

George W. Coffey retired as superintendent of the company's Summer

lee mine. He has been succeeded by J. F. McManus, formerly general mine foreman at Stanaford No. 2 mine.

R. P. Nicholls, superintendent of Oakwood mine at Carlisle, was appointed superintendent of salvage and equipment rehabilitation for the company. He was succeeded by O. B. Collins, formerly superintendent at Whipple mine.

Amos Smith was appointed superintendent of the Whipple mine.

John Peperakis has been named manager of the Sunnyside mines of the Kaiser Steel Co. He succeeds Robert Heers, who was recently named manager of mining and raw materials at Kaiser's steel plant in Fontana, Calif. Peperakis had served as assistant manager at Sunnyside since 1949.

The Kemmerer Coal Co., Frontier, Wyo., has announced the election of John L. Kemmerer, Jr., as chairman of the board, G. E. Sorensen, president, and L. M. Pat, Jr., vice-president in charge of sales.

Aluminum Co. of America has announced the transfer of two Refining Division men.

Dewey E. Sibbles, office manager of the Bauxite, Ark., Alumina Works, has been named to a similar post at the greatly expanded Mobile Works in Alabama.

William C. Johnston, senior accountant for Alcoa in Pittsburgh, has been named office manager of the Bauxite Works.

C. M. Hoard has been named division superintendent, the Marion Division, Bethlehem Mines Corp., at Fairmont, W. Va., succeeding W. E. Hall, deceased. Hoard has been with Bethlehem since 1927. Prior to his promotion he was superintendent of the Barrackville mine. Charles K. Dunlap succeeds Hoard as superintendent of the Barrackville mine.

Ross D. Leisk, manager of the Sunshine Mining Co., Kellogg, Idaho, since 1936, was recently named a vice-president and a member of the board of directors to succeed the late J. B. Cox.

1955 AMC Coal Convention and Exposition

WITH the appointment of Hugh B. Lee, president, The Maumee Collieries Co., as chairman of the Program Committee, plans for the 1955 American Mining Congress Coal Convention and Exposition are beginning to roll. Mr. Lee and a nationwide committee of coal mine operators and equipment manufacturers will handle the highly important job of selecting subjects and organizing convention sessions to bring the industry up to date on the latest advances in coal mining technology. To them will also fall the task of selecting the best qualified speakers to present the topics chosen.

Suggestions as to subjects and speakers should be sent to the American Mining Congress, Ring Bldg., Washington 6, D. C. Early in November the Program Committee will meet to consider the many suggestions submitted and to select a comprehensive and well-rounded program.

From May 16 to 19, the Public Auditorium in Cleveland, Ohio, will again house the big AMC Coal Show. All types of equipment and supplies germane to the mining and preparation of coal will be exhibited in what promises to be the greatest Coal Show ever.



Richard N. Hunt, vice-president and chief geologist of the U. S. Smelting Refining & Mining Co., has been elected a director of the Hecla Mining Co. Hunt succeeds A. W. Witherspoon, who has retired from the Wallace, Idaho, company.

Dr. M. M. Leighton, chief, Illinois State Geological Survey, has retired from his duties after 31 years in that post and 35 years as a geologist. Dr. John C. Frye, formerly state geologist and executive director, Kansas Geological Survey and Professor of Geology of the University of Kansas, succeeds Dr. Leighton.

C. J. Barber has been promoted to mine engineer of the United States Smelting Refining and Mining Co. in Salt Lake City. Barber succeeds Frank B. Harris, who retired after 30 years of continuous service with the company.

Floyd W. Erickson has been appointed general superintendent of the Babbitt taconite processing plant of the Reserve Mining Co.

In mid-August it was announced by the United States Smelting Refining and Mining Co. that W. C. Page, who had asked to be relieved of the duties of vice-president and general manager of Western Operations for reasons of



W. C. Page



O. A. Glaeser

health, was elected vice-president and consulting engineer.

Oscar A. Glaeser, formerly assistant general manager of Western Operations, was elected vice-president and general manager of Western Operations, succeeding Page.

Dr. J. Brian Eby, former chief of the Shell Oil Co.'s Gulf Coast geophysical department, has been named a director of the Texas International Sulphur Co. Eby will be in charge of the Houston, Tex., company's explorations for sulphur currently being carried on in the Isthmus of Tehuantepec, Mexico.

At a meeting of the board of directors of Copper Range Co. held August 9, **Albert Pratt**, a partner in the firm of Paine, Webber, Jackson & Curtis, and **Walter Hochschild**, president

of the American Metal Co., Ltd., were elected directors to fill the vacancies caused by the resignations of Edward Cunningham and Philip F. Beaudin.

Reid J. Sampson has announced his retirement from the California State Division of Mines after 25 years of service. Although he has no specific plans for the future, Sampson expects to keep in close contact with mining activities.

Edwin J. Eisenach has been promoted to the new post of assistant general superintendent of Climax Molybdenum Co. at Climax, Colo. Replacing him as assistant mine superintendent is **William Distler**.

C. Wilbur Marshall has been appointed vice-president and manager of the Virginia division of Lone Star Cement Corp., Richmond, Va. He succeeds **Dwight Morgan**, who has retired after 31 years of service.

Harold L. Gardner, mine engineer for International Minerals & Chemical Corp., Carlsbad, N. M., has resigned that post.

Richard C. Cole has joined Vitro Uranium Co., a division of Vitro Corp. of America, according to an announcement by William B. Hall, general manager. Cole became plant manager of the uranium ore refinery at Salt Lake City.

— Obituaries —

Don Carlyle Chafin, 67, Logan County sheriff and a non-union leader in the 1920-21 West Virginia mine wars, died August 9 in Huntington, W. Va.

Thomas S. Haymond, 85, pioneer coal miner in eastern Kentucky, died July 14 at his home in Hattiesburg, Miss.

Besides being a pioneer in development of the Big Sandy coal field in eastern Kentucky, Mr. Haymond was connected with the Elkhorn Coal Co. and was extremely active in the Democratic party for many years.

W. E. Hall, 70, for the last nine years division superintendent, the Marion Division, Bethlehem Mines Corp., died July 28 at Fairmont, W. Va., after a long illness. Mr. Hall spent his entire life in coal mining. He joined the Bethlehem organization more than 30 years ago.

Jack E. Taylor, 65, general manager of the High Splint Coal Co. for 20 years and president of the Harlan County Coal Operators Association, died at Williamsburg, Ky., July 20 of a heart attack.

Jude G. Lewis, 56, former senior vice-president and district manager of Wm. H. Ziegler Co., Inc., died August 14 in Duluth, Minn. Mr. Lewis had retired from the Ziegler Co. June 1 because of illness.

Mr. Lewis was born in Foreston, Minn. He attended the University of Minnesota, where he majored in mining engineering. Before his association with Wm. H. Ziegler Co., Inc., Mr. Lewis was superintendent of mines and quarries for the Clement K. Quinn Ore Co.

He joined the Ziegler Co. as branch manager of the Duluth office in 1930. In 1942 he was elected vice-president and a director of the company and in 1952 he was appointed senior vice-president, a position he held until his retirement this year.

Harry A. Swem, 64, vice-president and general manager of Sulphur Operations for Texas Gulf Sulphur Co., died of a heart attack August 8 in Newgulf, Tex.

Mr. Swem was born August 2, 1890, in Denver, Colo., and spent most of his life in mining. He majored in geology and mining at Stanford University and went to work for the Nevada Consolidated Mining Co. after graduation. Later he joined the Chile Exploration Co. in Chile.

After World War I, in which he was a lieutenant in an engineer battalion, Mr. Swem joined Texas Gulf Sulphur Co. in the engineering department. In 1921 he was named loading superintendent at Gulf Camp, Tex., and in 1925 was promoted to field manager. In 1928 he was transferred to Newgulf as field manager there and in 1929 was named assistant manager. On January 14, 1953, he was elected to the position he held at his death, vice-president and general manager of Sulphur Operations.

Thomas Clinton Mullins, 69, president of Midland Electric Coal Corp. and vice-president of the Southwestern Coal Corp., died suddenly July 26 in Chicago, Ill.

Mr. Mullins was born in Fayetteville, Ark., in 1885. He attended the University of Arkansas and was graduated as a civil engineer in 1906. For a time he engaged in the general practice of civil and mining engineering. In 1913 he became one of the original organizers of the Sunlight Coal Co., one of the first stripping operations in Indiana. Through the years he was recognized as a leading figure in the strip mining industry.

NEWS

and VIEWS



Eastern and Central states



New U. S. Steel Coal Washer

State, county and local civic leaders joined with U. S. Steel officials at Corbin, Ky., August 3, in ground breaking ceremonies starting construction of a new coal washing plant.

To be known as the Corbin Washer, the 14-story high structure will be equipped to wash coal mined at Lynch, Ky., for U. S. Steel's lake shore steel plants at the rate of 12,500 tpd. Until now coal from the Lynch mines has been sent to the coke ovens without cleaning.

Raw coal will be brought from Lynch in railroad cars. At Corbin it will be crushed to a maximum size of four in. and a separation made at $\frac{1}{4}$ in. The plus $\frac{1}{4}$ -in. material will be cleaned in a sand cone. The minus $\frac{1}{4}$ -in. coal will be washed on concentrator tables, filtered centrifugally and then heat dried. Refuse from the plant will be handled hydraulically.

Expected to be completed early in 1956, the washer will prepare a uniform product for shipment by rail to Lake Michigan and Lake Erie steel mills of the corporation.



Karl L. Konnerth, vice-president of U. S. Steel's coal operations, climaxed the ground breaking ceremonies for the corporation's new Corbin, Ky., coal washer when he drove a bulldozer blade into the ground at the site to formally start construction

Another Anthracite Use

Designation of the Philadelphia & Reading Coal & Iron Co. as exclusive licensee for manufacture and distribution of the first packaged fuel product developed by the Anthracite Institute's Laboratory has been announced by Edward G. Fox, P & R president.

The anthracite-derived product, already being marketed under the trade name, "Bonnie Burns Briquets," is a new fuel for all types of grills and fireplaces. Initially introduced in May by the Anthracite Institute, it is now being distributed in the East through various large retail outlets. Packaged in cellophane-wrapped two-lb cardboard boxes which act as starters to ignite the briquets, the new product eliminates fuel handling, any need for kindling fuel, saves time and provides cleanliness.

Stith Mines Sold

Physical properties of the Stith Coal Mining Co., Walker County, Ala., have been sold to Marc Levine Industries. The purchase includes all machinery, equipment, and land including the mining village at America, Ala.

Founded in 1906, the Stith mines until recently were heavy producers. More than 500 miners were employed during World War II.

Climax Expands Research

A quarter of a million dollar expansion in molybdenum research was announced in Detroit, Mich., by Alvin J. Herzog, vice-president of Research for the Climax Molybdenum Co. The expansion will be mainly in research in molybdenum chemicals and in molybdenum-base alloys for high temperature use.

Herzog announced the acquisition of a modern building immediately adjacent to the present Climax laboratories at 14410 Woodrow Wilson Ave., Detroit. This, he said, will add 8000 ft of floor space to the company's present research facilities.

THE HEART of your preparation plant

Successful coal cleaning oftentimes depends upon the proper type of crushing of raw coal, middlings, and refuse. Your crushing equipment is not an auxiliary but is the heart of your preparation plant.

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Non Reversible
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Dixie Non Clog
Hammermills
Single Rolls
Reversible Impactors
Kue-Ken Jaws
Kue-Ken Gyratories

Armco Buys Princess Dorothy

Armco Steel Corp. has acquired the stock of the Princess Dorothy Coal Co. which operates the Robin Hood mine in Boone County, W. Va., W. W. Sebald, president, has announced.

"The Robin Hood mine will be operated by a separate company for the time being," Sebald said. L. F. Reinartz, an Armco vice-president, will be the new president of the Princess Dorothy Coal Co. Andrew O'B. Hogue has been president of the company for many years.

The Robin Hood mine has a capacity to produce 50,000 tons of coal per month and employs about 300 persons. It has openings in both the Dorothy and Hunshaw seams.

Breaker Team Wins

The Locust Summit Central Breaker team won the title of Golden Anniversary First Aid Champions at The Philadelphia & Reading Coal & Iron Company's annual First Aid Contest at Lakewood Park, Pa., August 14. The winning score was 99.8333.

Members of the team included: Leonard Banning, Robert Vaughn, Henry Baur, Thomas Reidinger, William Nuss, Sr., Raymond Mock and Edward Koch.

Second place went to the Potts Colliery with a 99.5333 score, and the third place winner was the Engineering Department with a 99.4666 score.

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Ship Ungava Ore

The first 20,000 tons of iron ore from the newly developed Ungava iron ore fields of Labrador and Quebec, Canada, slid into the hold of the S. S. Hawaiian July 31.

The affair launched the career of the Iron Ore Co. of Canada as a major supply of iron ore. Among the firms which make up the Iron Ore Co. of Canada are: The M. A. Hanna Co.; Hollinger Consolidated Gold Mines Corp.; Youngstown Sheet & Tube Co.; National Steel Corp.; Armco Steel Corp.; Wheeling Steel Co., and Republic Steel Corp.

The Ungava field is being hailed as the successor to the Mesabi Range. Huge iron deposits straddle the Quebec-Newfoundland boundary about 360 miles northeast of Seven Islands, Quebec. A 356-mile railroad had to be built through rugged terrain to connect the iron ore deposit with a tide water harbor about 600 mi northeast of Montreal.

The project is Canada's largest mining development and is reported to have cost \$250,000,000 to develop.

Cement Producers Committee Formed

Howard I. Young, President of the American Mining Congress has announced the appointment of an AMC Cement Producers Committee, composed of the following:

Charles B. Baker, President, Universal Atlas Cement Co., New York

Garner A. Beckett, President, Riverside Cement Co., Los Angeles

Cris Dobbins, President, Ideal Cement Co., Denver

B. W. Druckenmiller, President, Penn Dixie Cement Corp., New York

J. F. Magee, President, Alpha Portland Cement Co., Easton, Pa.

W. C. Russell, President, Peerless Cement Corp., Detroit

Smith W. Storey, President, General Portland Cement Co., Chicago

Walter A. Wecker, President, Marquette Cement Manufacturing Co., Chicago

Joseph H. Young, President, Lehigh Portland Cement Co., Allentown, Pa.

Ex-officio members of the committee include R. A. Hummel, chairman of the board, Lone Star Cement Corp., New York, and D. S. MacBride, President, Hercules Cement Corp., Philadelphia, both of whom are directors of the American Mining Congress.

The AMC Cement Producers Committee met in Chicago, September 9. At the meeting, the Committee reviewed the new revenue law and its effect upon the cement producing industry, and discussed such other matters as the Contract Renegotiation Act, air and water pollution, labor

relations, the defense mobilization program as it affects the mineral industries, and plans for the AMC Mining Show in San Francisco, at which a number of cement producers take part in the program.

The Committee was formed for the purpose of developing plans for closer cooperation of cement producers in the over-all work of the American Mining Congress. As in the case of other AMC Committees, its recommendations on national mineral poli-

cies will be submitted to the Board of Directors for their consideration and action. The combined efforts of this important branch of the mineral producing industry, and of the producers of nonferrous metals, iron ore, bituminous and anthracite coal, strategic and precious minerals, and a wide range of nonmetallic minerals make it possible to present, through the American Mining Congress, a united front on national policies of concern to the entire mining industry.

SuperDuty Tables Synonymous With Modern Concentration

Modern mineral separations are most efficiently made by the SuperDuty DIAGONAL-DECK Table. Its concentrating accuracy at maximum production assures highest grade concentrates, exceptionally clean tailings and, at the same time a reduced volume of middlings. Such tabling provides higher initial yield at lower treating cost.

This exceptional efficiency stems from (a) the diagonal deck that places 75% more working riffles in the natural path of material flow (b) the time-proved anti-friction bearing head motion and (c) the factory aligned underconstruction.

No other concentrating device is both so highly efficient and so economical in operation.

For full information, ask for Bulletin 118-B.

CONCENCO Type "CPC" Classifier

This all-steel Constriction Plate Classifier is available in 1 to 10 or more cells. Each cell has a pressure chamber at the bottom, a sorting column just above, and a launder section at top. Advantages offered are: (1) Sharp separation, (2) accurate classification, (3) as many spigot products as there are cells, (4) continuous discharge, (5) no moving parts, (6) low maintenance cost.

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JOURNAL

SEPTEMBER, 1954

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IMD-AIME Meeting

The annual meeting of the Industrial Minerals Division-AIME will be held October 5-9 at Whiteface Inn, Lake Placid, N. Y. A complete schedule of pertinent technical papers has been arranged, along with several interesting field trips and a full program of social events.

Refractories Plant Bought

International Minerals & Chemical Corp. has acquired Sonsel Refractories Corp. at Brighton, Mich., Louis Ware, president of International, recently announced.

The newly acquired plant will continue production of zirconium refractories under a patented process and other special refractories on an expanded scale as part of the Eastern Clay Products Department of International's Industrial Minerals Division. The plant also produces plastic refractories, castables, ladle linings and cupola patching materials.

Dredging Coal

The Pennsylvania Water & Power Co. has started to "mine" its own coal from the bottom of the Susquehanna River bed. The company expects to obtain enough coal from the river bot-

tom to meet its power generating demands for 30 or 40 years.

"River coal" consists of small sizes of anthracite brought down by the Susquehanna River from the Pennsylvania anthracite fields and deposited on the bottom of the lakes formed by the Safe Harbor and Holtwood hydroelectric dams. Penn Water has built new coal production facilities with a washing plant designed to produce about 2400 tons of coal every 24 hr from the mixture of sand, silt and coal dredged from the bottom.

Ohio Safety Winners

Dun Glen No. 11 mine and the Georgetown preparation plant won safety awards at the 24th All-Ohio Safety Congress held in Columbus, Ohio. With a frequency rating of 9.50, Dun Glen had the least number of accidents of all mines in Ohio employing over 300 persons. The Georgetown preparation plant received the award in the classification including all surface operations employing over 90 persons.

Jensie mine of Warner Collieries beat out Dun Glen No. 11 mine by a fraction of a point for first place in the annual first-aid competition. Dun Glen came in second, followed by Piney Fork No. 1 mine. Columbia-Southern Chemical Corp.'s Midvale mine took fourth place.

Lorado Scholarships

Stanley B. Johnson, Jr., president of The Lorado Coal Mining Co., has announced the award of scholarships at West Virginia University to Doran Nester and Lowell Leach of Lorado, W. Va.

Both students are sons of Lorado Coal Mining Co. employes and were graduated this year from Man High School with outstanding records. Nester was salutatorian of his class and Leach ranked in the top 10 percent. Both received top grades in the coal mining course offered at the high school.

In addition to their scholastic achievements both awardees participated in national honor society activities, football, basketball, baseball and track. Nester captained the basketball team during the past year and Leach was captain of the football team.

Haitian Bauxite

Reynolds Mining Corp. is planning a strip operation at Miragoane, Haiti. It is hoped that this job will go into production by the end of 1955, and that about 1000 tons of ore will be shipped each day to the company's processing plant at Corpus Christi, Texas. Brown and Root are consultants on this job.

Construction is well under way on 20 staff houses, a medical dispensary and auxiliary buildings. A mountain haulage road with a ten percent maximum grade is currently being built from the pier site to the bauxite deposits, which are 2000 to 3000 ft above sea level.

Producing Nickel Powder

Eldon L. Brown, president and managing director of Sherritt Gordon Mines Ltd., announced to stockholders August 11 that pure nickel powder and by-product ammonium sulfate are now being produced in commercial quantities using a new, entirely chemical process. The plant which embodies the new process is expected to reach rated capacity sometime in the fall.

Brown said: "No troubles were encountered with the process, which has been working exactly as the pilot plant operation indicated it should. The nickel metal produced has been right up to specification since the start of production July 22."

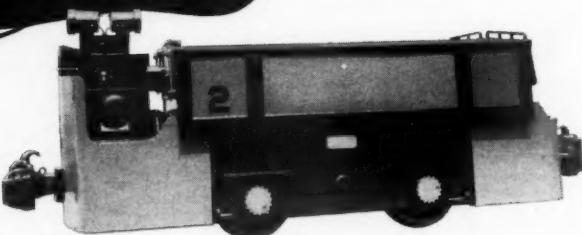
The firm's mine at Lynn Lake, Brown added, "is currently producing nickel concentrate at a rate considerably in excess of our estimates."

The huge refinery, the first of its kind in the world, was designed and constructed by Chemical Construction (Inter-American) Ltd. of Toronto. The process was developed and is controlled jointly by Sherritt and Chemical Construction Corp., a unit of American Cyanamid Co.

GREENSBURG EIGHT TON MONITOR

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Lehigh Valley in Uranium

Lehigh Valley Coal Corp. has established an ore mining division to acquire and develop uranium and thorium properties. These activities, including the development of the new energy sources to the point of industrial adaptation, will be carried on in cooperation with other companies experienced in mining and metallurgical treatment of fissionable materials. The Ore Mining Division will have its offices at 120 Wall Street, New York.

Don't Touch Blasting Caps

Many children are victims of blasting cap accidents each year. Some lose fingers and hands, others are blinded.

In a cooperative effort to cut down these unnecessary accidents, the United States Post Office Department and Bureau of Mines have joined forces in a nation-wide educational campaign to alert boys and girls to the danger of blasting caps in inexperienced hands.

A two-color poster to inform children what blasting caps are and warn them to leave them alone has been distributed for display in 40,000 Post Offices across the nation. In big red type the posters warn boys and girls "DON'T TOUCH BLASTING CAPS."

Annual Conference of the Coal Division

William Penn Hotel, Friday, November 19, 1954

THE COMMITTEES of the Coal Division will meet for their Annual Conference at the William Penn Hotel in Pittsburgh, Friday, November 19. At this time, each committee, listed below, will present preliminary reports on the studies that are being made. Copies will be available so that these reports can be discussed in open forum; suggestions and comments offered from the floor will be considered by each committee for possible incorporation in the final reports.

The purpose of the committees is to present to the industry accounts of best practices that are being developed in all phases of coal mining and preparation—with new and improved equipment. All coal operators and manufacturers are invited to attend this conference to hear the reports and take part in the discussions.

Committee on Coal Preparation	—R. L. LLEWELLYN, Chairman
Committee on Conveyor Haulage	—H. A. JONES, Chairman
Committee on Mechanical Loading	—WM. E. HESS, Chairman
Committee on Mine Ventilation	—A. J. OPPERMANN, Chairman
Committee on Rail Haulage	—J. D. REILLY, Chairman
Committee on Roof Action	—G. N. McLELLAN, Chairman
Committee on Underground Power	—JOHN A. DUNN, Chairman

It shows four different types of blasting caps and admonishes youngsters to report to a policeman, a sheriff, or some other adult, if they find one.

Cement Company Improvements

Universal Atlas Cement Co. has announced it plans to proceed with a construction program at its Fairborn, Ohio, and Independence, Kans., plants. In Fairborn, the U. S. Steel subsidiary will expand finished cement storage and add a rotary kiln which, along with other approved facilities, will increase by one-third the capacity of the plant.

Proposed construction at the Independence plant will include a new raw materials crushing plant, as well as facilities for storage, drying, and blending and the replacement of outmoded equipment.

Michigan Limestone Quarry

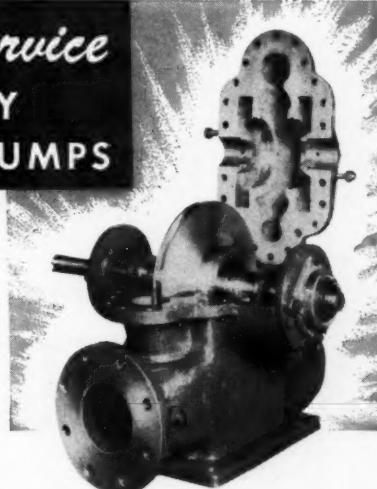
A new source of limestone for the United States Steel Corp. will be opened on Michigan's Upper Peninsula late this year. Michigan Limestone Division of the steel corporation expects to begin shipping from Port Dolomite, Mich., next spring.

Port Dolomite is located between McKay and Bush Bay on Lake Huron, 35 miles south of Sault Ste. Marie. The quarries lie five miles inland near Cedarville.

Construction crews first started work in April 1953. They are presently pushing a railroad line from the quarry through five miles of rugged terrain and swamp to the lake port.

Stone will be hauled from a primary crusher on the quarry floor to the Port Dolomite area where secondary and tertiary crushers and a screening plant of about 1800 tph capacity will size the stone into eight grades.

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Mr. A. E. Condon, manager of sales of the Jeffrey Fan Division says: "We have been using PENETROL for painting fan casings for four years, and it has been doing a good job. The paint containing liberal amount of PENETROL really penetrates, and has good adhesion qualities to the metal surface. It gives us long-lasting protection against rust and corrosion."

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Pitt-Consol Bids for Jamison Coal & Coke Co.

George H. Love, president of Pittsburgh Consolidation Coal Co., has confirmed that his company has submitted an offer to purchase Jamison Coal & Coke Co. of Greensburg, Pa., for a cash consideration of approximately \$10,000,000.

The Jamison properties primarily include the Jamison No. 9 Mine on the B. & O. Railroad in northern West Virginia. This is an up-to-date mine with a modern preparation plant and approximately 8500 acres of Pittsburgh seam coal.

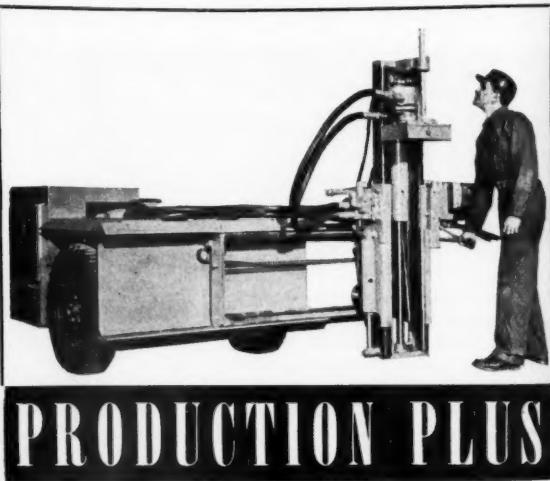
Love said that the offer was prompted by the need to replace Pitt-Consol production capacity along the B. & O. Railroad. "Just during the past three years," Love said, "three of our B. & O. mines, which formerly produced 1,400,000 tons annually, were worked out. The Jamison mine, which produced just over 1,000,000 tons in 1953, would partially replace these exhausted properties.

"The acquisition, if consummated, would thus give us a long-life operation where most needed and enable us to maintain continuity of service to long-time customers in the areas reached by the B. & O."

Safety Pays Off

Red Jacket Coal Corp., Red Jacket, W. Va., recently honored five foremen who achieved the outstanding safety record of supervising sections on which a lost-time accident had not occurred for five consecutive years with a two-day, all-expense trip to Washington, D. C. Red Jacket started these awards in 1951 and this group brings to 14, the number of foremen so honored.

Those making the trip to Washington were W. M. Harlow and Curt Matney, Keen Mountain; Orville Godfrey, Coal Mountain mine; Ira Bradford, Wyoming mine; and H. B. Artis, No. 17 mine.



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FLETCHER ROOF CONTROL DRILLS deliver high-capacity roof bolting performance shift after shift—keep ahead of big-production mining units, eliminate bottle-necks.

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VPI Scholarship

A \$300-per-year scholarship at the Virginia Polytechnic Institute has been established by the Virginia Coal Operators Assn. The scholarship in mining engineering will be awarded to a male resident of Virginia. It may be renewed from year to year if the holder does satisfactory work.

Engineers in Demand

The coal industry is neither obtaining nor using its fair proportion of mining engineer graduates, reports the National Coal Association's Mining Engineering Education Committee.

Meeting at Columbia University, the committee urged coal executives to take the following course of action:

(1) Increase your company's participation in scholarships for mining engineering.

(2) Offer more summer employment to mining engineering undergraduates, which gives better opportunity for companies to select future employees.

(3) Place mining engineering graduates under supervision whose attitude will be encouraging rather than discouraging; and

(4) After a minimum of practical seasoning, give the graduate mining engineer an opportunity to assume real responsibility.

The reports stated that in view of keen competition from sources other than the coal industry for mining engineering graduates, it behooves the coal industry to go "all out" to secure and retain engineering graduates.

Jersey Mine-Quarry Bill

Governor Meyner has signed (July 24) into New Jersey law a bill providing the first major revision of state mine and quarry regulations since 1919.

The measure was a committee substitute for bills introduced by Assemblymen Elden Mills of Morris County and Arthur W. Vervaat of Bergen County, both Republicans.

Under the new law, the State Department of Labor and Industry is given a \$70,000 appropriation with which to establish a mine safety section with powers of inspection and enforcement.

The measure provides that underground mines must be inspected at least once every three months, while other working mines and quarries must be inspected at least twice a year. The commissioner is empowered to promulgate rules for mine safety and to issue cease and desist orders in the event of dangerous conditions.

A group of mine and quarry workers and operators and State Labor and Industry Commissioner Carl Holzerman were present as the governor signed the bill.

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Eagle-Picher Doubles Ore Reserves

The Eagle-Picher Co. has purchased from Calumet & Hecla, Inc., its zinc properties in the Wisconsin-Illinois field comprising leaseholds on approximately 3650 acres of land, as well as a mill, supplies and materials. Calumet & Hecla, Inc. has operated these properties continuously since 1948 when they were acquired from a development subsidiary. This acquisition will more than double Eagle-Picher's zinc ore reserves in the Wisconsin-Illinois area.

During 1953 the Eagle-Picher Co. purchased the mining properties and equipment of Bilharz Mining Co. and the Gordon mine of American Smelting & Refining Co. pursuant to its policy of increasing domestic reserves of zinc ore whenever favorable opportunities arise. Its chief mining activities presently are in the Tri-State District (Missouri, Kansas, Oklahoma), and in Mexico.

Fifty Years of Safety

The Philadelphia and Reading Coal and Iron Co. observed the 50th anniversary of the founding of its safety program—oldest continuous program in American industry—with an intra-company contest of its first aid teams at Lakewood Park, Pa., on August 14.

The teams, representing operating units, competed for the title of Golden Anniversary First Aid Champions before upwards of 1000, including employees and officers of the company and their guests.

J. J. Forbes, Director of the U. S. Bureau of Mines, presented Certificates of Honor of the Joseph A. Holmes Safety Association to three P & R operations for outstanding safety achievements.

Gordon E. Smith, Deputy Secretary of Mines, extended the greetings of the Pennsylvania Department of Mines to the meeting.

Edward G. Fox, P & R president, made the prize awards.

The Crescent Shaft

(Continued from page 26)

mediate pump station. The sump tank for this pump was made from three four-ft lengths of 20-in. Naylor spiralweld pipe.

All motor pumps were operated automatically by electrode switches.

Incentive Pay Sped Sinking

Sinking operations were carried on six days a week and three shifts per day. The crew on each shift consisted of four shaftmen, one skiptender, and one hoistman. One mechanic on day shift completed the sinking crew.

The crew was selected from the Bunker Hill mine crew with the addition of two or three men hired for

the job. Although none of them had had the experience with the Riddell mucker, they proved to be a very capable and efficient crew after an initial "breaking in" period. All men on the job participated in an incentive plan.

A total of 2000.5 ft of shaft was sunk, seven stations excavated, and two pocket raises driven in slightly over 11 months. The rate of advance was 7.1 ft of shaft per operating day and 8.4 ft per shaft-sinking day. The total direct cost for the 2000.5 ft of shaft was \$410,502.60, or \$205.20 per ft.

In a shaft of sufficient depth to justify the original expenditure for equipment, mechanical mucking has been perfected to the point where it is quite efficient and is much faster than hand mucking. In addition to benefits from added speed over hand mucking, it is much easier on the men. On this particular job, the entire crew in 11 months had only one man quit before the job was finished.

Absenteeism was much lower than mine average. Also, the lost-time accident rate was much lower than the average of the Bunker Hill Mine. In deep shafts where hoisting of the broken rock becomes a "bottleneck," the intermediate transfer makes it possible to speed the removal of broken rock and maintain a higher and more uniform rate of progress.

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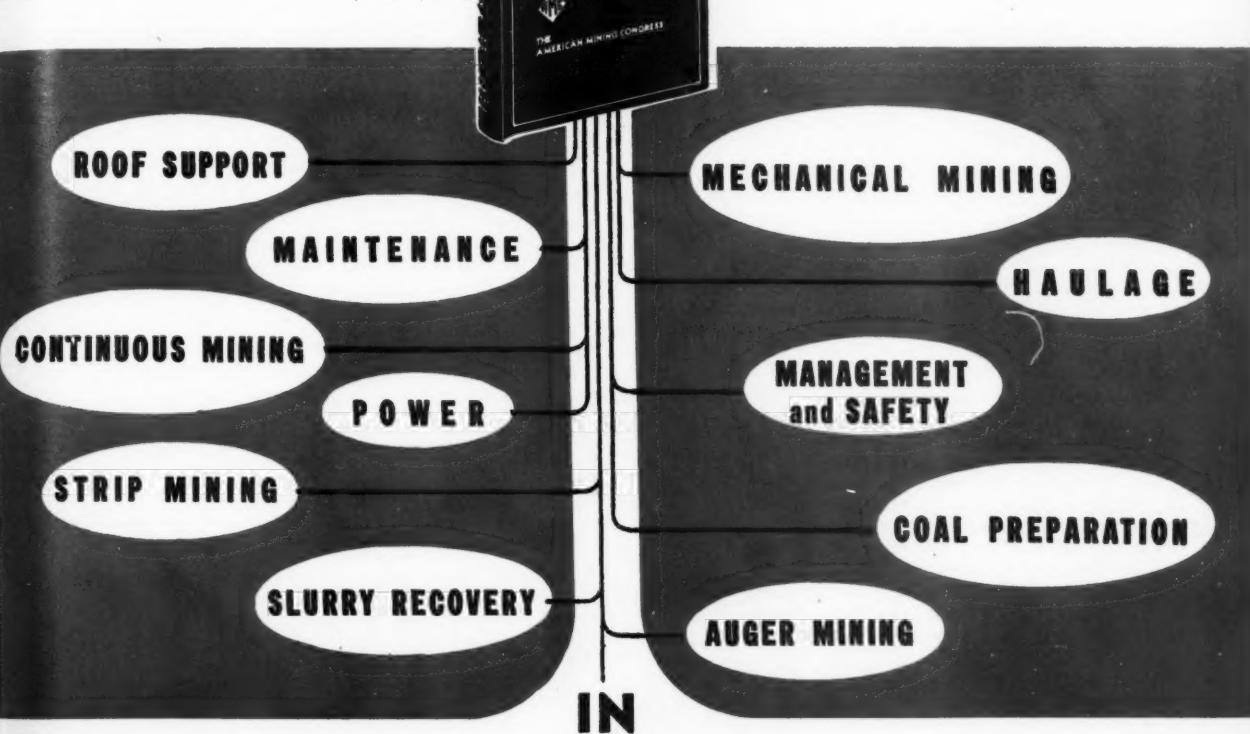
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Utah Copper's 50th Birthday

ON August 13 and 14, the fiftieth anniversary of the Utah Copper Division of the Kennecott Copper Corp., was celebrated with the unveiling of a heroic size statue of Daniel C. Jackling in the rotunda of the Utah State Capitol at Salt Lake City, and the dedication of Kennecott's new research center, located on the University of Utah campus.

Jackling, widely known as the "father of the porphyries," was the man who envisioned the methods now used in mining and milling the huge Bingham Canyon ore body. In fact, he led a revolution in copper mining and his effect on this and many other branches of the mining industry will be felt for years to come.

Mining at Bingham Canyon actually had its start back in 1863, when the first mining location in Utah was made as the Jordan lode. The location was the result of the discovery earlier that year of fragments of lead ore in the canyon. In 1864 gold was discovered which spurred activity. However copper ores, because of their low grade, were ignored and it was not until 1896 that the first important copper shipment was made by the Highland Boy, which started as a gold mining venture. The mill, originally built to recover gold from Highland Boy ore, was unsuccessful because of the copper impurities contained in the ore. Until 1900 Bingham remained a lead-silver camp with 15 to 20 comparatively small mines, shipping their ores to smelters at Murray and Midvale.

In 1887 Colonel Enos A. Wall staked out 12 copper claims in the area. By 1900 his property consisted of all or part of 19 claims covering 200 acres, and Captain Joseph D. Lamar had secured an interest in the property. At this time Robert C. Gemmell was mining engineer at the Golden Gate mine in Mercur, Utah, for Captain Lamar and D. C. Jackling was metallurgist in charge of building a cyanide mill there. Gemmell and Jackling joined forces to sample ore in Bingham Canyon. Gemmell was in charge of sampling the ore body and estimating the tonnage. Jackling was in charge of the concentrating tests.

The joint report issued by these two was the first comprehensive analysis of a mining enterprise based on exploitation of ore containing as little as two percent copper. It can be said that Utah Copper Co. was born in this report, but there were many difficulties to be overcome in the ensuing years. The revolutionary plan of applying mass mining methods to copper production from low-grade ores had to be sold to the industry and financing had to be arranged for. However, in 1903 a group of men decided to exercise the option they held on Bingham Hill and on June 4, 1903, the Utah Copper Co. was organized under the laws of Colorado. An ex-

perimental mill was built at Copperton. Its capacity upon completion in April 1904, was 300 tons a day. This had increased to 1000 tons daily, when it was closed in 1910.

In 1904 the Utah Copper Co. was reorganized under a New Jersey charter. The need now was for working capital to buy equipment, build mills and a railroad. A 6000-ton concentrator at Garfield was started in 1906 and put into operation in August 1907. Mining, however, was yet confined to underground as finances to begin a stripping operation were not yet available.

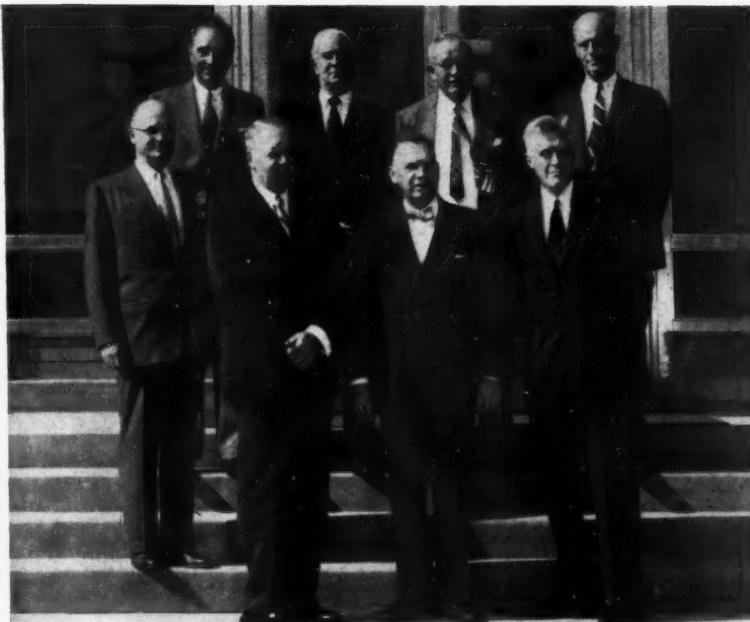
The first small steam shovel went into operation in 1906. By 1908, eight steam shovels and 17 steam locomotives were furnishing two-thirds of the ore from open-pit operations. Underground work on the west side of the pit stopped, but continued on the east side until the summer of 1910. Milling and mining facilities were steadily improved and in 1925 the stripping shovels were converted from steam to electricity.

Kennecott Copper Corp. took control of Utah Copper in 1923 and since that time the big pit at Bingham Canyon has been operated as the Utah Division of Kennecott.

From the first shovel-full of ore mined at Utah Copper through June



Jackling statue dedication in a rotunda of Utah State Capitol Building. Charles R. Cox, president of Kennecott Copper Corp., is speaking



Directors of Kennecott Copper Corp. pose on front steps of Kennecott's New Research Center before going inside to conduct a board meeting. They are, front row, left to right, Leland B. Flint, Medley G. B. Whelpley, Charles R. Cox, president; and Henry S. Drinker; back row, left to right, Albert E. Thiele, Charles Sawyer, Charles L. Tutt and Robert G. Stone.

30, 1954, 694,617,774 tons of copper ore have been mined. From this ore 12,367,967,352 lb of copper were extracted.

The genius and daring of Daniel C. Jackling, in developing methods for mining and processing low-grade copper ores has certainly paid off. Today the Utah Copper Division of Kennecott Copper Corp. produces approxi-

mately 30 percent of all requirements for new copper of the United States. It has done so for many years. Jackling was the man with vision who saw how the large size and uniform mineralization of the Bingham ore body would lend itself to large-scale operation and make economically possible the recovery of valuable metals from such low-grade material.

Open Lavender Pit

On August 6 the Lavender open pit copper mine of Phelps Dodge Corp. at Bisbee, Ariz., was formally opened.

The mine, named for the late Harrison M. Lavender, former Phelps Dodge operations manager at Bisbee, was developed without Government aid. More than 45,000,000 tons of waste had to be removed to get at the ore.

Kitimat in Operation

The first aluminum ingot was poured August 3 at Kitimat, British Columbia, Canada, marking the completion of the first stage of the vast hydroelectric and aluminum smelter project constructed by Aluminum Corp. of Canada, Ltd., on Canada's Pacific coast.

Spread out over a 9600 sq mi area of unsettled territory, the vast Kitimat project will eventually have a hydroelectric capacity of 2,240,000 installed hp, the largest ever undertaken by private enterprise. The first stage of

the project, now in operation, uses a hydroelectric capacity of 420,000 installed hp and will produce 91,500 tons of aluminum annually.

Construction of the project has taken more than three years since its inception was announced April 21, 1951.

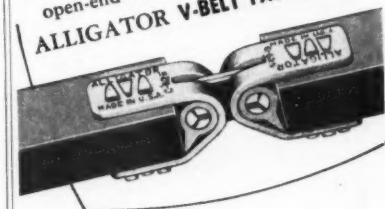
By October, 1952, more than 6,000,000 tons of rock and clay had been moved in Nechako River canyon to form the Kenney Dam. It is the third largest earth-filled dam in the world and holds back the water in a 150-mi long lake and river reservoir system. One of the toughest phases of the job was the 10-mi tunnel, 25 ft in diam, which leads the impounded water through the mountains to turbines in the Kenney powerhouse, a vast cavern, one quarter mile inside the mountain. A 50-mile aluminum transmission line crosses a 5000-ft mountain pass to conduct electrical energy from the powerhouse to the potlines in the aluminum plant.

Alumina is shipped from Jamaica through the Panama Canal to the Kitimat smelter.

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Lucky Friday Progress

Lucky Friday Silver-Lead Mines Co. is maintaining a 100-ft per month rate of advance in the three-compartment shaft-raise being driven to provide better shaft facilities for mining operations at its property east of Mullan, Idaho. In late July the raise was 60 ft above the 1200 level, leaving 1140 ft to go before holing through on the main adit level.

Progress is reported in two other development headings on the 2300 level, the mine's deepest. Production is being maintained at the rate of about 125 tpd, six days a week. A large stock of ore has been accumulated and a mill-run was started at the Golconda Concentrator in mid-July.

Shale Plant Reduces Operations

The U. S. Bureau of Mines Oil Shale plant at Rifle, Colo., has reduced operations as of July 1, according to Boyd Guthrie, in charge of the plant. Refining work was stopped according to plan. Paper work on refining of oil shale will continue, according to Guthrie.

Present plans call for continuing the retort work at the plant. Crude oil created in the retorts was being

processed in the refinery into several petroleum products. Now all oil produced will be utilized at the plant.

The cut in the refinery work came as experimental work on the refining phase at the plant was completed. It was not considered advisable to continue the refinery operation in view of current economy trends.

Lease Uranium Properties

Idaho-Maryland Mines Corp. has leased about 1200 acres in the uranium district southeast of Moab, Utah. The three separate blocks are leased from the State of Utah.

Zinc Roasters Win

Zinc Roasters at the Great Falls Reduction Works won the first aid contest for employees sponsored by the Anaconda Copper Mining Co. at Great Falls, Mont. Four teams tied for second. Three were from Great Falls and one from the East Helena plant.

The Great Falls Reduction works Electrical shop was also awarded the Dr. Joseph A. Holmes safety award for no lost time through injuries during the past seven years. The award was made by L. L. McGuire, Seattle, regional chief of accident prevention for the U. S. Bureau of Mines.

Uranium Leases in Wyoming

About one-third of Wyoming's state owned land is applied for, or leased for, exploration and development according to Wyoming State Land Commission. In the week beginning June 21, leases were issued or applied for covering 293,000 acres, twice the amount under uranium lease on state land a year ago. Most of the present 220,726 acres of land under uranium lease or applied for are in Sweetwater, Carbon, Uinta and Lincoln Counties.

Border Lord Resumes Work

Border Lord Mining Corp. has announced plans for resumption of operations at its tungsten property west of Loomis, Wash. The first project will be the completion of the mine access road. About 11 miles of new road were put in last year, extending the mine access road to a total of 20 miles.

As soon as the road is completed an air compressor which has been purchased and is now being completely overhauled will be moved in. During the working season last year the mill was readied for operation, a new miners' dry house was constructed and equipment for an electric light plant was packed in or dropped by parachute.

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Reports Commercial U-Ore

The uncovering and mining of uranium and vanadium ore of commercial grade, and acquisition of 50 additional claims by Amuranium Corp. were announced in a report sent to stockholders in early August by T. Peter Ansberry, chairman of the board.

According to Ansberry's report, exploratory mining was begun on July 20 and commercial ore was uncovered on July 24 in Amuranium's McGee Mine on their Brown's Hole Group, located in the Lisbon Fault-Big Indian area, near Moab, Utah.

The acquisition of 50 additional claims brings Amuranium's total to over 180. Among those recently acquired is the "Joe Palooka" group.

Wyoming Uranium Ore Depot

The United States Vanadium Co. has announced establishment of a uranium ore buying station and sampling depot at Shoshoni, Wyo., on the Chicago and Northwestern Railroad. Shoshoni, in Fremont County, is ideally located for the depot, the Wyoming Natural Resource Board has said. It is near the heart of the uranium exploration boom in Fremont County and has adequate transportation facilities. Wyoming uranium producers have been shipping their ore to the AEC ore-buying station at Edgemont, S. D.

Polaris Cuts High Grade Ore

High grade ore has been intersected by Polaris Mining Co. crews pushing the Big East Exploration Project of the company. E. W. Conrad, Jr., president and general manager has reported. The ore was encountered in the "American Silver-Silver Standard compromise area (American Silver extraterritorial rights area)," he said.

The ore was found at its downward projection from the 2800-ft level opened by the Coeur d'Alene Mines Corp. several years ago. The Polaris tunnel is being driven from the 3000-ft level of the Silver Summit mine. "This chimney-like ore shoot has been one of the main objectives of the Polaris exploration work in the American Silver mineralized zone," according to Mr. Conrad. It is planned to raise in ore to connect with the 2800-ft level workings and provide ventilation and an escapeway.

The property is located in the Coeur d'Alene district of Idaho.

Alunite Production Nears

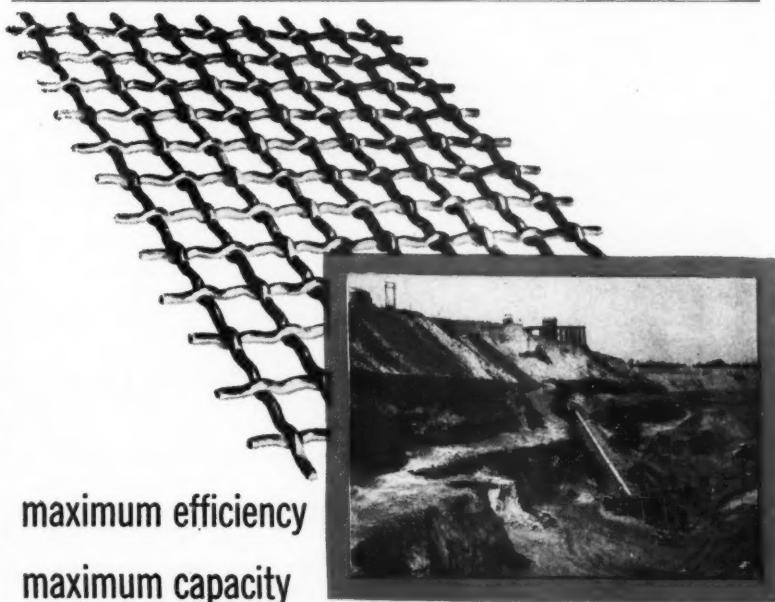
A program to develop vast western mineral resources to provide a low-cost, high-yield fertilizer for the American farmer has been reported by Ralph M. Parsons Co., consulting engineers. The report discloses that Calunite Corp., composed of New York

and Los Angeles businessmen, has been engaged for six years in development work on alunite, a mineral found in quantity in southern Utah. First used during World War I as a substitute for potash, alunite contains potassium, magnesium, sulphur, iron, manganese, boron, copper, zinc, sodium, molybdenum and calcium. Alunite ores blended by means of a special process and mixed with nitrogen and phosphorous result in the commercial fertilizer calunite.

Calunite Corp. reportedly controls

some 34,000,000 tons of alunite in the vicinity of Marysvale, Utah, where a \$175,000 mill to process the ore is in final stages of construction. Plans are also nearing completion for establishing fertilizer mixing plants in California, Illinois and Arkansas where the new plant food will be distributed initially. Soil tests indicate its cost to growers for normal applications will be about \$12.50 an acre.

Calunite has also acquired alunite deposits in Arizona, Colorado and Nevada in addition to those in Utah.



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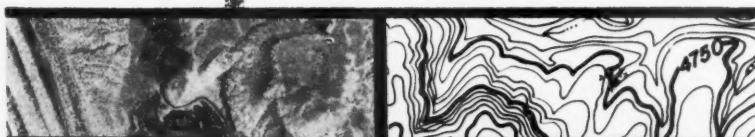
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C&H Prospects in N. M.

Calumet & Hecla, Inc. have signed an agreement with Canoncito Uranium Corp. of Albuquerque, N. M., to prospect and develop a large acreage of land in the Grants District 25 miles west of Albuquerque, N. M. Under the agreement, Calumet & Hecla will start prospecting the property immediately. The tract is adjacent to, and carries the geological extensions of, the producing uranium properties of the Laguna Indian Reservation to the west.

Complete Vulcan Shaft

It appears that the Vulcan-Galena project on Lake Gulch west of Wallace, Idaho, will be in production early next year. Development work is proceeding rapidly.

The four-compartment main shaft from the 3000 to the 3400 level has been completed and a station and pockets for the new 3400-ft level are now being cut. As soon as this work is completed a south crosscut will be started to open the downward extension of vein structures already exposed and partially developed on upper levels. The principal objective will be the tetrahedrite vein discovered early last year on the 3000 level and since explored upward to the 2400 level.

A mill expansion project which will increase the plant's capacity from 150 to about 350 tpd is also proceeding on schedule.

Black Hills Mineral Atlas

All available information on known mines and mineral deposits in South Dakota's Black Hills will be summarized in a comprehensive "mineral atlas" being prepared by the Bureau of Mines. The first volume of the two-part report, covering Lawrence and Mead Counties and parts of Butte and Pennington Counties, has already been released.

When completed, the report will make possible a general determination of the potentialities of the Black Hills as a mineral-producing region. It will also provide basic information necessary for detailed study of a given property or commodity.

The report discusses the history, production, and geology of the Black Hills. It indexes mines and mineral properties alphabetically, numerically, and by commodities, and gives brief but detailed descriptions of each property. A bibliography is included.

A copy of I. C. 7688, "Black Hills Mineral Atlas, South Dakota, Part I," can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

Crescent Work

Work at the Crescent property of the Bunker Hill & Sullivan Mining & Concentrating Co. has passed another milestone with the start of lateral exploration of the new 3200-ft level. Two exploration headings are being run in the Idaho mine. Both are on a three-shift basis.

The Crescent property was reopened and rehabilitation work begun in late 1952 after 10 years of idleness. Since the sinking program which extended the three-compartment shaft from the 1200 to the 3200-ft level was completed last May, crews have been cutting stations and pockets and installing facilities for the extensive exploration program.

Block Out Uranium Ore

The Edgemont Mining Co. of Edgemont, S. D., reports it has drilled and blocked out two large uranium ore bodies near Edgemont.

Design Mill for Monticello

Signing of a contract by the Atomic Energy Commission with the Galigher Co., of Salt Lake City, for the design of additional plant facilities at Monticello, Utah, to treat refractory ura-

nium ores which cannot be processed by the existing Government-owned plant, was announced by Sheldon P. Wimpfen, manager of the Grand Junction Operations Office of the Raw Materials Division of the Commission. The facilities to be added will be operated in conjunction with the present ore-processing plant.

Under terms of the contract, the Galigher Co. is to prepare the engineering design, including plans, specifications, and cost estimates for the addition to the plant which will treat uranium ores by an acid leaching process. The Galigher Co. expects to complete the design work during the summer months. Later—probably in the fall—the Commission will ask for bids for constructing the addition.

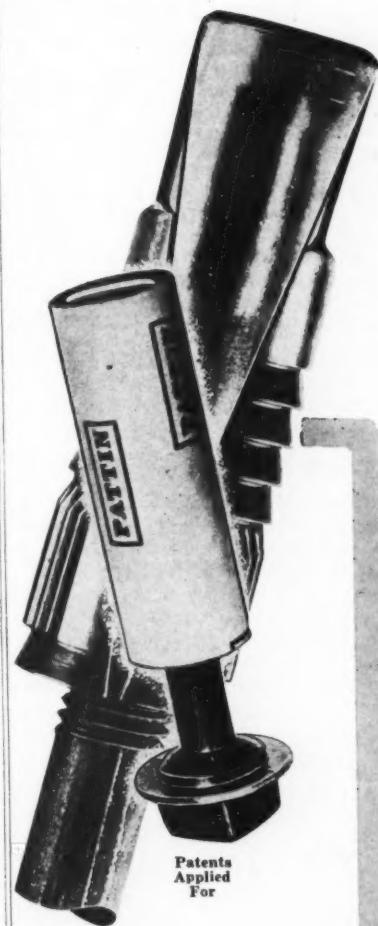
The present Monticello plant, operated by the Galigher Co. for the Commission since its renovation in 1948, handles the normal carnotite ores of this area through treatment in a soda ash circuit. Wimpfen pointed out, however, that the Monticello plant is not equipped to extract uranium from the large tonnages of widely-varying types of uranium ores that have accumulated as a result of the Commission's willingness to provide a market for ores other than those of the carnotite-roscocite type. These complex and difficult-to-treat ores have been purchased and stockpiled at Monticello to encourage uranium miners to find and mine more tons of ore. As the stockpiles acquired under this policy grew, development of a method of treating them became necessary.

Gold Mining in Colorado

In spite of the current interest in uranium mining in La Plata County, Colo., there is still considerable gold mining going on in that old mining county. Recently a shipment of high grade ore was made from the Bessie G. Mine, 27 miles from Durango, which would make even the richest uranium king envious. According to Karl S. Goff, vice-president of Zodomoc Mines, Inc., the recent shipment from the Bessie G. at the smelter in Leadville, Colo., ran an amazing \$12,145 per ton. A total of 347 oz of gold was extracted from the raw ore!

First California U-Ore Sold

A carload of ore from what is probably the first commercial uranium mine in California has been delivered to the Vitro Uranium Co. plant in Salt Lake City. William Hall, general manager of Vitro, confirmed that the ore was shipped by the Miracle Mining Co. from a property at Miracle Hot Springs, 35 miles northeast of Bakersfield, Calif. Interest in uranium exploration and mining in California is picking up throughout southern California as a result of recent discoveries in that state.



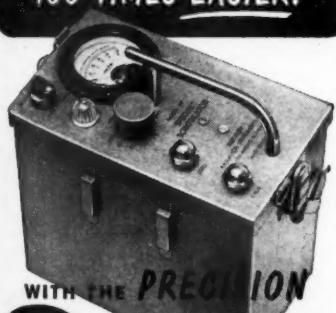
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Travona Mine Closed

High operating costs have forced the closing of the Travona mine in Butte, Mont., according to Chester H. Steele, vice-president in charge of western operations for the Anaconda Copper Mining Co.

The main shaft of the Travona mine is on the first lode claim located in the district. This location, known as the Asteroid, was made by W. L. Farlin late in 1864. Later it was relocated as the Travona by W. A. Clark. The mine was operated as a silver producer until 1892 when the decline in the price of the metal brought the silver mining era in Butte to a close. Since World War I the mine has been operated for its manganese ore.

New Uses for S. D. Minerals

Profound changes in the utilization of South Dakota's mineral resources were predicted at a recent meeting of the Missouri Basin Inter-Agency Committee in Rapid City, S. D. Dr. J. P. Gries of the Department of Geological Engineering at the South Dakota School of Mines and Technology said that recent developments and discoveries in the mineral industry field will ultimately step up production and

utilization of the state's minerals resources.

He said wide-scale utilization of the vast lignite coal resources is within the foreseeable future because of investigations by the U. S. Bureau of Mines and private industry. He also predicted ultimate usage of the huge low-grade manganese deposits along the Missouri River.

Drill at Idaho Custer

The initial diamond drill phase of a Defense Minerals Exploration project has been started by Idaho Custer Mines, Inc., at its Livingston property in Custer County, Idaho. A contract has been awarded for 1000 ft of core drilling from the 2400 level workings of the mine. This is the lowest level of the mine and is now accessible through a surface adit which has been reopened.

New Crusher

A new rock crusher has been installed by the Tower Mining and Refining Co. at its mill in Truth or Consequences, N. M. The new crusher is expected to permit increased ore shipments. At the present time the firm is shipping about 500 tons of manganese ore each week.

New Stack for Bunker Hill

The multi-million-dollar plant improvement and modernization program of Bunker Hill & Sullivan Mining and Concentrating Co. is just about completed. The latest step in the program was the putting in operation of a new 202-ft smokestack at the Kellogg, Idaho, lead smelter.

All the new units, including the Wheelabrator baghouse and the three-unit charge preparation plant, are in operation and performing satisfactorily, according to the company. The program was started in 1951.

Tooele Plant Closed

The Tooele lead-zinc reduction plant, operated by the International Smelting and Refining Co., was shut down in July. According to officials, operations were stopped because of insufficient ore for treatment by the mill and smelter. This in turn reflects the poor condition of the lead and zinc industry in the Tooele, Utah, area.

Add to VCA Uranium Mill

Work has begun on an addition to the Durango mill of the Vanadium Corp. of America as part of a 25 percent expansion of VCA facilities in Durango, Colo., and in northwestern Arizona. In Durango, the company will install a new ore roaster. More crushing, leaching and precipitation equipment will also be added.

This work is being done following the approval of an amendment to the company's contract with the Atomic Energy Commission providing for the new facilities and extending the contract until 1958. Other provisions give VCA the right to install the necessary equipment to concentrate, at its Monument No. 2 mine in northeast Arizona, vanadium-uranium ore which has heretofore not been considered as mill grade.

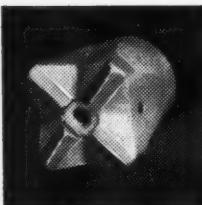
Acquire Canadian Lithium

In a move to consolidate their holdings of lithium ore properties in North America, Lithium Corp. of America, Inc., has acquired control of the Cat Lake, Manitoba Canadian properties formerly owned by Northern Chemicals, Ltd.

These properties have been held by Northern Chemicals, Ltd. in which Lithium Corp. of America, Inc. has held a substantial interest. In a recent move, Lithium Corp. of America, Inc. acquired 100 percent interest in Northern Chemicals, Ltd. by means of an assignment of Northern Chemicals, Ltd. to the American company.

At present there are no mining or recovery activities although some diamond drilling and surface trenching has been completed.

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Up-Grade California Iron Ore



A new plant designed to extract the maximum amount of iron ore from the high-grade deposits of Kaiser Steel Corp. at Eagle Mountain, Calif., near Desert Center, has been completed and placed in operation.

These new facilities, according to Jack L. Ashby, vice-president and general manager, are the only units of their kind in operation in the West especially built to up-grade iron ore. The higher-grade ore resulting from this operation will bring about transportation savings in the movement to the steel mill and will permit new operating efficiencies in the blast furnaces at Fontana.

The average iron content of the ore as mined from the open pit operation is 51 percent. After being processed through the new facilities, the ore will have an average iron content of 56 percent.

The first step in the process is a magnetic unit which attracts high-grade magnetite ore. The remaining ore (hematite) is then sent through

a heavy density vessel where the higher-grade ore is taken off and combined with the high-grade magnetite ore for loading into railroad cars. The ore with lower iron content is sent to a waste stockpile.

The plant, constructed by Kaiser Engineers Division of Henry J. Kaiser Co., is designed to process more than 2,000,000 tons of ore per year.

This marks another step in the company's extensive development program at Eagle Mountain, where deposits are sufficient to supply Kaiser Steel's operations for many decades. Recent additions at Eagle Mountain include a new recreation hall and 96 new homes for employees and their families. Because of the desert location of the mine community, about 200 miles east of Los Angeles, the company recently installed a television transmission tower enabling employees and their families to view their favorite Los Angeles programs. Approximately 200 employees and their families live at the mine.

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Open Pit Uranium Mine Slated

A 37-acre area of the Todilto uraniferous limestone on the Front Range Oil and Uranium Co. property at Prewitt, N. M., will be developed by quarrying instead of underground mining methods, the company has reported.

In addition to the open pit property, the company owns a lease on a section of land in San Miguel County, Colo., which has not been tested as yet.

Old Mines May Be Worked

Plans are being made by the San Juan Mining and Developing Co. to reopen and work several old gold and silver mines in the Trout Lake mining district of San Miguel County, Colo. The firm is headed by Charles H. Turner, formerly with the Climax Uranium Co. at Grand Junction.

Properties held under lease include the Esmeralda group of eight patented

claims. These include the Esmeralda, Esmeralda No. 2, Magnolia, Golden Dream, Walkover, Brookside, and Gold Coin lodes. The property was operated continuously from 1898 until about 1905 and intermittently until about 1921. Present plans are to de-water a 325-ft shaft and rehabilitate the lower workings.

A second property under lease includes the Alpine Lode and the Mystery Lode, westward extension of the Esmeralda vein system. The claims have two 600-ft tunnels. A small amount of production was reported from the upper tunnel about 1900.

New Eureka Ore Body

Consolidated Eureka Mining Co. has encountered a new lead-zinc-silver ore body in cross-cutting operations at its mine in Nevada's Eureka district. The ore has been described as of "good grade" and is in addition to ore encountered in the mineralized section of a parallel structure earlier.

New Look at Inspiration

(Continued from page 32)

ton of ore sent to treatment. In this respect Inspiration is moving ahead and during the last few years notable progress has been made.

Enlarge Leaching Vats

In 1948 it was realized that in order to maintain copper production with lower grade of ore, more leaching capacity was necessary. Room for horizontal extension of the leaching vats was not available. Therefore, it was decided to increase their height and the walls were raised 18 in., giving a capacity increase of about 10 percent. This job presented an interesting problem, as the walls had to be raised without interfering with normal operation.

The presence of slimes always complicates vat leaching. Percolation of solutions and wash waters through the bedded ore is interfered with and extraction suffers. This had long been recognized at Inspiration and suitable facilities had been provided to deslime the Leaching Plant feed. In recent years, the proportion of primary slimes in ore being mined from certain sections of the orebody was on the increase. This, together with a 10 percent increase in plant capacity, called for revision in fine crushing and classifying practice to meet the situation.

For the successful leaching of sulphide ores, contact time, strength, and temperature of the solvent are all important. To gain more contact time, a revision of solution flow made it possible to adopt a "continuous" wash in place of the previous "batch" wash system. By this means it has been

possible to gain 24 hr additional contact time for leaching. Further research was successful in developing improved control over the ferric sulphate content of the leaching solvent. Taken together, these several forward steps have vastly improved the outlook for successful leaching of the increased sulphide content of present-day ores.

Miscellaneous

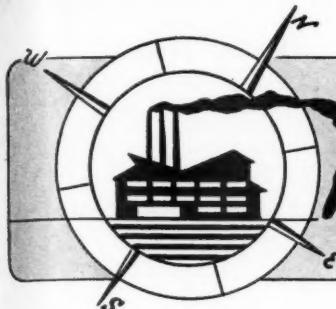
In bringing Inspiration operations up to date, other forward steps have been taken. At Inspiration we have 17 miles of standard gauge railroad. This railroad has been completely dieselized and five diesel electric locomotives are in service.

Railroad operations, as well as open pit operations, are controlled by two-way short-wave radio communication.

The main coarse crushing plant has been completely modernized. Four vibrating rod deck grizzlies and two seven-ft standard cone crushers have replaced the original plant which contained twelve individual crushing units.

All in all, with the assurance of longer life brought about by conversion to open pit mining and the improvements in metallurgical practice, Inspiration has gone ahead to meet the new situations constantly arising. Every effort has been made to improve control, flexibility, and efficiency of operations.

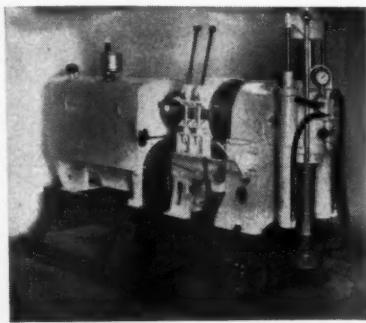
In this era of change, a "new look" is necessary. At Inspiration the "new look" involves a broader approach, by management and staff, in considering the ever-changing problems of the day. Only by recognizing the constant need for improvement will it be possible to meet the challenge presented by these changing times!



Manufacturers Forum

New Diamond Drill

E. J. Longyear Co. announces its new diamond core drill, the Longyear "44." The new "44" incorporates many recommendations of diamond



drill operators all over the world according to the manufacturer.

Designed for deeper holes, the "44" has a capacity of 3000-4000 ft of A rods. A new hydraulic swivel head will accommodate all standard sizes of rods, including 2 1/2-in. flush-coupled rods, Longyear Wire Line rods, and the newly-adopted world standards.

A wide selection of gasoline, Diesel, air or electric motor power is available.

Yuba Re-Enters Dredge Field

Yuba Mfg. Co., 351 California Street, San Francisco 4, announces its re-entry into the hydraulic dredge field.

According to a company spokesman, Yuba will build hydraulic dredges from six inches up, for such diversified uses as harbor construction, hydraulic fills, channel excavation, levee construction, and production of sand and gravel.

Announce New Rectifier

A new metallic rectifier for mine use, capable of powering two shuttle cars underground at the same time, has been announced by the General Electric Co.'s Lighting and Rectifier Department.

Designed to supply 50 kw of 250-v, d-c power from a three-phase, 60-cycle, four-wire supply, the rectifier

is available in either 230 or 460-v a-c input ratings. Weighing about 1800 lb, it measures 31 in. high, 36 in. wide, and 61 1/4 in. long.

The unit is equipped with two output circuits rated continuously at 100 amp for operation of shuttle cars, and one circuit rated continuously at 20 amp for powering auxiliary tools. It is rated at 200 amp d-c continuous, 300 amps for 10 minutes infrequently applied, and 400 amp, for one minute infrequently applied. Each 100 amp d-c circuit is capable of carrying 50 percent of the listed overload ratings.

The new product is designed specifically for mine operation. Skid mounted, braced, and made of heavy gauge steel, it can be dragged over mine floors.

Roof Bolting Drill

A practical answer to the problem of clean, fast roof bolt drilling is offered in the Holman Dryduct, air driven percussion drill, according to the Goodman Manufacturing Co., Chicago, Ill. The Dryduct extracts dust



and chips as they are made, passes them through the drill and draws them away from the operator and face crew by a pipe line to a dust collector. The Dryduct can be used to drill up, down, horizontally or at any angle, and through shapes. It can be hand held or used with any type light mounting. The drill and dust collector have been approved by the Health Division, U. S. Bureau of Mines.

Shovel for Bulk Materials

A new, small, mobile power shovel with a capacity of 11 cu ft or 1200 lb suitable for handling sand, fertilizer, chemicals and other loosely packed bulk materials in close quarters is now in production by the Industrial



Truck Division of Clark Equipment Co. Named the Bulk Master, the shovel has an outside turning radius of only 73 in.

Full-shovel lifting speed of six sec, dumping speed of one sec and lowering speed of three sec, with a dumping angle of 60°, are features of the machine. Bucket can be carried without spillage in completely lowered position.

For further information on the Bulk Master write to Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.

Personnel Towers

A new series of Hi-Ranger extendible personnel towers has been placed in production by Mobile Aerial Towers, Inc., 1405 North Clinton, Fort Wayne, Ind.

Series 3 and 4 Hi-Rangers are designed to place a worker at maximum platform heights of 32 ft and 40 ft respectively. Maximum working heights are five or six ft higher. Special heights and weight capacities are available within each series.

The manufacturer states a principle advantage of the new units is their great flexibility in mounting.

Literature, photographs and prices are available from the manufacturer.

Introduces Coal Loader

The introduction of a new, unique loading machine with a maximum capacity of 5 tpm has been announced by the Long Co. of Oak Hill, W. Va.

Named the Long Model 88 Pigloader, this new machine is the first loader



that has been designed specifically for use with the Piggyback Conveyor, according to the manufacturer. The Pigloader is crawler-mounted and built to withstand hard usage. All machine operations are driven by a single 35-hp electric motor (U.S.B.M. approved) and all drives are mechanical. The machine is 26 in. high, 16 ft long and 5 ft 8 in. wide.

Btu Recorder Announced

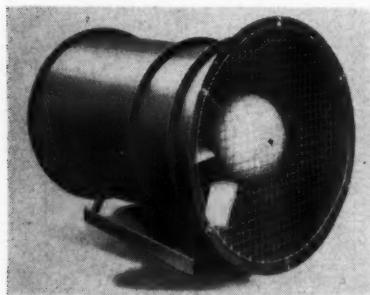
Fast, continuous measurement and control of rate-of-heat input or output is now possible through the use of the new Dynamaster Btu recorder-controller systems according to the Bristol Co. of Waterbury, Conn.

In the basic Bristol Btu recording system, one Dynamaster measures the temperature difference with two resistance thermometer bulbs and receives the flow-rate from a flow transmitter. From the two variables, it then continuously computes and records the Btu product.

Improve Ventilation

A new 6F Series Aerodyne Fan for coal and metal mine ventilation up to five-in. Water Gauge pressure has been announced by A. E. Condon, manager of the Ventilation Division, The Jeffrey Mfg. Co., Columbus 16, Ohio.

The portable fan is a self-contained



unit which needs no bearing alignment after installation. The fan features universally adjustable blades made of cast-aluminum alloy mounted on a solid aluminum alloy hub, with flange-mounted anti-friction bearings. The 6F is available with different lengths of expansion discharge for varying duties.

The new series has an overhung

drive and fan wheel and can be belt driven up to 125 hp. A higher horsepower can be utilized with a direct connected drive.

New Compressor

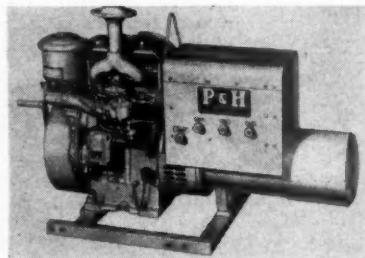
A packaged air compressor in the 75-100-hp range that approaches, according to the manufacturer, the good efficiency and economy of larger, more powerful, slow speed compressors has just been introduced by Ingersoll-Rand Co., 11 Broadway, New York 4.

The new machine, known as the PHE, is an opposed-cylinder, balanced design driven by a direct connected, induction motor. The basic design is a two-stage unit for 80-125 psi but other cylinder arrangements are available.

Gasoline Engine Welder

Harnischfeger Corp. announces a new gasoline engine driven arc welder now in volume production.

Power is supplied by a two-cylinder,



air-cooled gasoline engine close coupled to the P&H-built welding generator. Capacity is 20 to 200 amp. Weight of the Model WN-150 is only 425 lbs. and dimensions are: 45 in. over-all, 20 in. in height.

For complete information, write Harnischfeger Corp., 4601 W. National Ave., Milwaukee 46, Wis.

Front End Loaders

The Frank G. Hough Co. has recently announced the introduction of new models of the "HA" and "HAH" front-end shovel-loaders with torque-converter-drive as standard equipment. In addition, the "HAH" model is equipped with power steering.

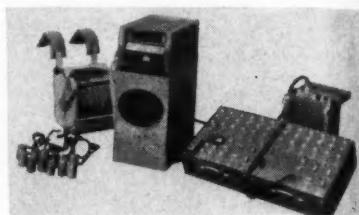
The "HA" has a "pay-load" capacity of 16 cu ft and a "struck-load" capacity of 12 cu ft. The "HAH" has a "pay-load" capacity of 24 cu ft and a "struck-load" capacity of 18 cu ft.

The four-speed, full-reversing transmission continues to be a feature of the new "HAH" model, providing four speed ranges from 0 to 23 mph. The new "HA" shovel-loader has a two-speed, full reversing transmission providing speeds from 0 to 11 mph. Full information on these new models may be obtained by writing to the Frank G. Hough Co., 846 Seventh St., Libertyville, Ill.

Reflection Seismograph

Application of the reflection seismograph in mining exploration is made practical with announcement of a new high resolution reflection seismograph system manufactured by Houston Technical Laboratories.

The HTL Model HR system is designed for extremely shallow reflection



work and provides seismic information in the depth range of 100 to 2500 ft. In mining exploration it furnishes data for mapping depth and extent of overburden and buried channels.

The HR system is especially designed for utmost portability and flexibility in field use. Lightweight unit construction, with components equipped with carrying handles or optional back-pack adapters, makes it suitable for operations in rough terrain.

For complete information, write to Houston Technical Laboratories, 2424 Branard, Houston 6, Tex.

Drum Dryer

A relatively high capacity, compact Rotating Drum Dryer is now being produced by Roberts & Schafer Co. for drying or heating granular crys-



talline materials in by-product processing industries. The dryer may be used in production or as a pilot plant unit.

Actual installations as a sand dryer have produced hourly capacities of three tons. The adjustable measuring feed and speed selection, in contrast with fixed speed, has the advantage of suiting the operation to the raw material. Complete information is available from the company at 130 North Wells St., Chicago 6, Ill.

Build Your Drilling Rig

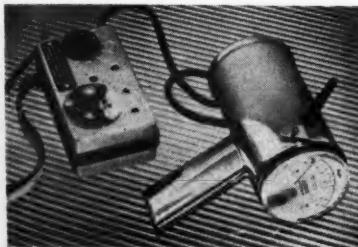
You can now design your own remote-controlled drilling rig to meet specific job conditions, and build it on your own truck, tractor, half-track, jumbo carriage or other available chassis. It's done with the new power swing jumbo booms, hydraulic pumps, and remote-controlled drill positioner units available from Gardner-Denver Co., Quincy, Ill.

The power swing jumbo booms are available in lengths up to 168 in., and swing hydraulically through a horizontal arc. Hydraulic power also raises and lowers the boom through a vertical arc.

These are the same boom and control units which are mounted on the Gardner-Denver self-propelled Model JSP Mobiljumbo for remote-controlled drilling, and Gardner-Denver engineers have successfully installed the various units on many types of chassis mountings. Their experience is available to any contractor or mining engineer planning to build a drilling rig with Gardner-Denver hydraulic units.

Prospector's Survey Instrument

A sensitive Gamma-Beta radiation survey meter to replace Geiger or scintillation counters for prospecting was recently announced by the Jordan



Electronic Mfg. Co., Inc., 119 East Union St., Pasadena, Calif.

Use of a new principle in ionization chamber construction permits these instruments to detect changes in radiation as small as 0.002 mr/hr near background levels according to the company.

Designed with the help of mining engineers for prospecting, the control unit attaches to belt while gun assembly is carried with shoulder strap or in special holster.

Check Lumber Shipments

For those who buy lumber in the quantities required by mining industries, it is only good business practice to check for possible errors in board-foot measurements as shipments are received. A new pocket-size lumber rule reading directly in board-feet makes this profitable, but often neglected, habit easy to acquire.

Called the Lumtape, it is the first lumber-measuring device that can be carried in the pocket, instantly available at all times.

Measuring with the Lumtape is a convenient one-hand operation because: (1) its handy size fits the hand as neatly as the pocket; (2) its blade pulls instantly in and out to accommodate any required width; (3) a



thumb-lock holds the blade firmly extended as long as necessary. And no time-consuming arithmetic must be done to convert board-feet because the rule reads directly.

Descriptive literature is available from the Lumtape Corp., P. O. Box 614, Hillside, N. J.

Announcements

The appointment of L. Jack Clarke as general sales manager, Leschen Wire Rope Division, H. K. Porter Co., Inc., has been announced.

Femco, Inc., has announced the recent appointment of two sales engineers. Raymond G. Kelley will cover Michigan, Minnesota and Wisconsin, while Jack Helton has been assigned West Virginia and the Carolinas.

Negotiations have been completed for Chiksan Co., Brea, Calif., to take over the manufacture and sale of the Intelligent hydraulic mining gun from the Intelligent Corp. of Seattle.

Joy Mfg. Co., Pittsburgh, announces the election of John Lawrence as executive vice-president.

Lawrence joined the company in July 1951, as vice-president of manufacturing and in April 1953, was named vice-president of manufacturing and engineering. His prior experience includes seven years with SKF Industries, Inc., where he served as vice-president, and 10 years with Jones and Lamson Machine Co., where he was factory manager.

American Mine Door Co., Canton, Ohio, has announced the addition of a Research and Development Department. The new department will be under direction of Glenn D. Gurney, director of engineering for the company.

CATALOGS AND BULLETINS

AIR COMPRESSORS. Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. Bulletin A-72 describes Joy Series 100, Class WN-114 heavy-duty air compressors. Complete information on construction and operation of the compressors is included.

AIR FOR YOUR ENGINE. Cummins Engine Co., Inc., Columbus, Ind. Air and what to do about it is the subject of this bulletin. It is dedicated to "better maintenance" among engine owners everywhere.

BENEFICIATION OF TUNGSTEN ORES. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. The brochure describes various methods of processing tungsten ores, particularly the froth flotation process used on western U. S. ores. Address requests to the Mineral Dressing Department of the company.

CaCO₃. Gardner-Denver Co., Quincy, Ill. A 23-min 16-mm sound-color film showing drilling and blasting operations in an underground limestone quarry. Prints are available from Gardner-Denver Co. for showing to engineering societies, civic organizations, schools, churches and other interested groups.

MINE CARS. Bethlehem Steel Co., Publications Dept., Bethlehem, Pa. Catalog 354 describes Bethlehem mine and industrial cars. Illustrated are cars of large and small capacities, four-wheel trucks, all-steel construction, forged steel wheels, automatic couplers, side-dump and end-dump, floating drawbars and other features.

RIKEN METHANE INDICATOR. National Mine Service Co., Beckley, W. Va. Bulletin describes the operation of the Riken Methane Indicator. Design eliminates combustion of gas by hot wire and need for recalibration.

98 SERIES SHOVEL-CRANE. Link-Belt Speeder Corp., 1201 Sixth St., S. W., Cedar Rapids, Iowa. Descriptive literature is available outlining operation of Link-Belt Speeder's new one-yd shovel-crane. The machine is being offered in three models, the crawler-mounted, the truck-mounted and wheel-mounted. All are equipped with power hydraulic controls.

SPRAY HOSE. Quaker Rubber Corp. Div. of H. K. Porter Co., Inc., Tacony and Comly Sts., Philadelphia 24, Pa. A specific hose for each type of spraying job is described. Well-illustrated by cross-section and cutaway photos, it gives performance data, constructions, sizes, weights, working pressures and recommended uses.

THE QUARRYSMASTER. Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. Bulletin describes the new QM-2 Quarrysmaster. Its features and uses as a percussion drill and as a rotary drill are described. Dimensions and specifications and list accessories that are available are also included.

WIRE ROPE RECOMMENDATIONS AND CATALOG. John A. Roebling's Sons Corp., 640 South Broad St., Trenton, N. J. Catalog is designed to provide a simplified ordering plan and reference for wire rope users. It also includes photographs showing various wire rope applications in construction and mining.

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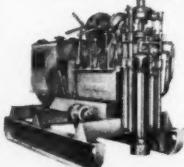
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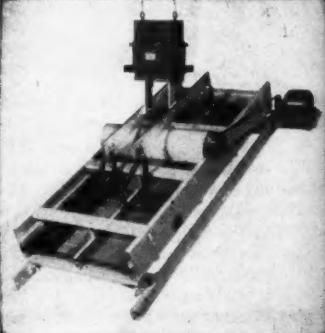
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Throughout the entire world Coromant tungsten carbide tipped integral drill steels have proved their right to leadership. Consistent uniformity—lower cost per foot of hole drilled, freedom from connection troubles, longer drilling life and Copco on-the-job service—these things have made them the only logical choice wherever drilling costs are most closely watched.

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With new continuous mining machines and fast-moving shuttle cars funnelling coal to a seven-mile, single-track system from 12 faces, Powhatan Mining Company officials faced the fact that production would "out run" haulage unless a plan could be devised to make existing facilities adequate for the job.

They found the answer in M.S.A. MinePhones. Twelve of these units were installed in the Company's No. 3 mine and another twelve at the No. 1 mine, near Bellaire, Ohio. The new system gives the dispatcher instant, continuous, two-way voice communication contact with locomotive motormen, the underground maintenance shop, and a "jeep" which carries men, and acts as an emergency vehicle. Now, haulage decisions are made quickly, keeping trips moving, minimizing "waits" on sidings. Repair needs are relayed "on the double," over-all safety has improved.

We will be happy to discuss your haulage system, and show you how M.S.A. MinePhones can aid efficiency, increase safety. Write for complete details.



MinePhone-equipped "jeep" carries fire extinguishers, first aid, Chemox breathing apparatus



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